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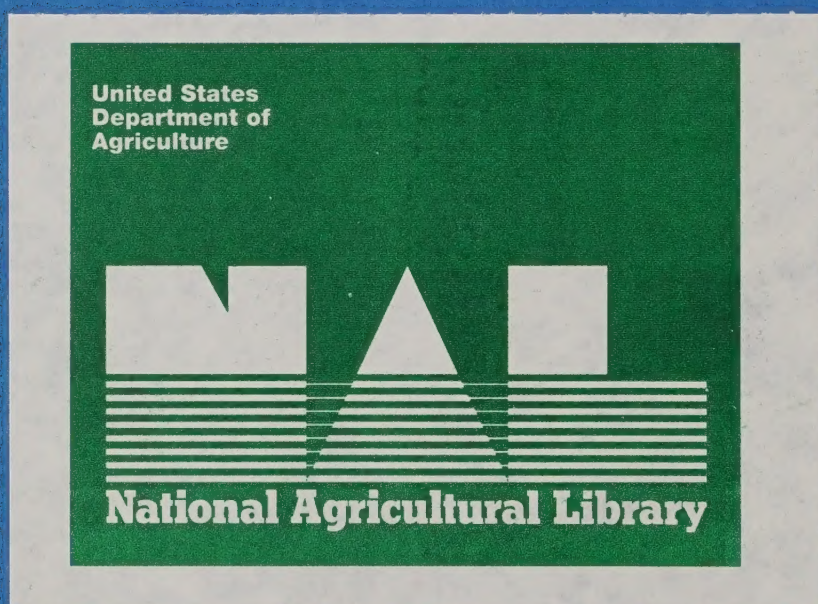
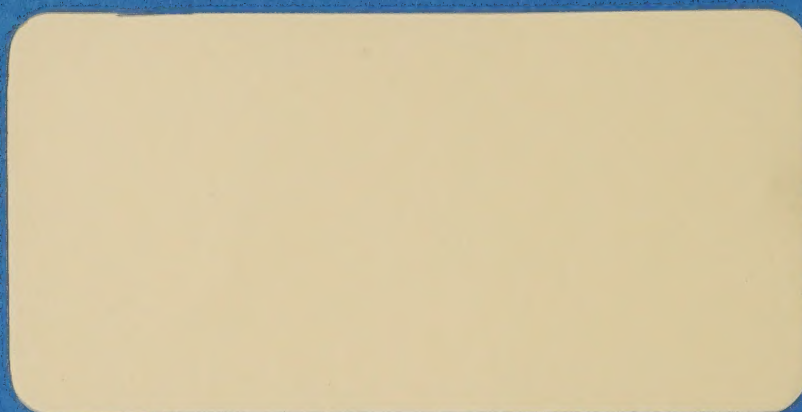
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INFORMATION ON
U.S. BIOLOGICAL CONTROL PROGRAMS
USING NATURAL ENEMIES AGAINST INSECTS,
WEEDS AND OTHER PESTS

AGRICULTURAL RESEARCH SERVICE (ARS)
U. S. DEPARTMENT OF AGRICULTURE

SEPTEMBER 1984



AGRICULTURAL RESEARCH SERVICE (ARS)
U. S. DEPARTMENT OF AGRICULTURE

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U.S. BIOLOGICAL CONTROL PROGRAMS USING NATURAL ENEMIES AGAINST

INSECTS, WEEDS AND OTHER PESTS

AGRICULTURAL RESEARCH SERVICE (ARS)

U. S. DEPARTMENT OF AGRICULTURE

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Compiled by J. R. Coulson and J. H. Hagan, Beneficial Insect Introduction Laboratory,
Insect Identification and Beneficial Insect Introduction Institute, Beltsville
Agricultural Research Center, Beltsville, Maryland 20705.

Please send corrections and additions to the compilers.

I. ROSTER OF ARS BIOLOGICAL CONTROL WORKERS

OVERSEAS LABORATORIES

ARS International Activities

B. M. Kopacz, Assistant to Administrator for International Activities, Bldg. 005, Beltsville Agricultural Research Center-West, Beltsville, Maryland 20705.
Telephone: FTS: 344-2605; Com.: 301-344-2605.

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
BIOLOGICAL CONTROL OF WEEDS LABORATORY, SOUTH AMERICA 1559 South Bolivar Hurlingham Buenos Aires, Argentina 011-54-1-665-0357 (Direct dial from U.S.)	Survey for, collection, study, and shipment of natural enemies of weed and insect pests in South America. NRP-20260.	1.0	<u>H. Cordo</u> 3/

APO Address - Buenos Aires/FAS
Department of State,
Washington, DC 20521 4/

EUROPEAN PARASITE LABORATORY La Pommeraie 13-17 rue de la Masse Behoust 78910 Orgerus, France 011-33-3-487-2075 (Direct dial from U.S.)	Survey for, collection, study, and shipment of natural enemies of insect pests in Europe, Near East, and North Africa. NRP-20260.	2.0 3.0	<u>B. D. Perkins</u> Vacancy F. Gruber 3/ F. Hérard 3/ H. Hoyer 3/
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APO Address - c/o American
Embassy, Agriculture
APO NY 09777 4/

OVERSEAS LABORATORIES

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
BIOLOGICAL CONTROL OF WEEDS LABORATORY, EUROPE Via Gastone Monaldi 34 00128 Rome, Italy 011-39-6-648-0140 (Direct dial from U.S.)	Survey for, collection, study, and shipment of natural enemies of weeds in Europe, Near East and North Africa. NRP-20260.	2.0 2.0	<u>P. H. Dunn</u> <u>S. L. Clement</u> <u>A. Rizza 3/</u> <u>P. Pecora 3/</u>
<u>APO Address -</u> c/o American Embassy, Agriculture APO NY 09794 <u>4/</u> <u>or</u> American Embassy, Agric/ Biocontrol Via Vittorio Veneto, 119 00187 Rome, Italy			
Faculty of Agriculture University Farm University of Thessaloniki Thessaloniki, Greece		1.0	<u>R. Sobhian 3/</u>
<u>APO Address - c/o American Consulate General APO NY 09693 4/</u>			
ASIAN PARASITE LABORATORY c/o Forest Research Institute 207, Chongyangri-2Dong Tongdaemun-ku, Seoul 131 Republic of Korea 011-82-2-966-8969 (Direct dial from U.S.)	Survey for, study, collection, and shipment of natural enemies of insect pests in the Far East. NRP-20260.	1.0	<u>R. W. Carlson</u>
<u>APO Address - c/o American Embassy APO San Francisco 96301 4/</u>			

-
- 1/ Scientist/year spent on biological control related activities.
2/ Research Leader or Location Leader underlined.
3/ Foreign national.
4/ APO address should be used for all official correspondence originating in the
U.S.

----- NORTHEASTERN REGION -----

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
<u>BELTSVILLE AGRICULTURAL RESEARCH CENTER</u>			
<u>INSECT IDENTIFICATION AND BENEFICIAL INSECT INTRODUCTION INSTITUTE</u>			
SYSTEMATIC ENTOMOLOGY LABORATORY Bldg. 003 BARC-West Beltsville, Maryland 20705 FTS: 344-3183 COM: 301-344-3183	Taxonomic research on beneficial insects and mites, and their arthropod hosts. Identification of specimens and other taxonomic services. NRP-20260.	8.0 ^{5/}	R. D. Gordon E. E. Grissell T. J. Henry L. Knutson (Service) P. M. Marsh (Research) M. E. Schauff R. L. Smiley D. R. Whitehead N. E. Woodley
BENEFICIAL INSECT INTRODUCTION LABORATORY Bldg. 264 BARC-East Beltsville, Maryland 20705 FTS: 344-3185 COM: 301-344-3185	National responsibility for documentation of biological control introduction programs. NRP-20260. Research on and evaluation of native and introduced natural enemies of weeds. NRO-20260. Research on and evaluation of native and introduced natural enemies of insect pests. NRP-20260. Biosystematics and genetics of beneficial and exotic insects. NRP-20260.	0.5 0.9 0.9 0.7 1.0 1.0 1.0 1.0 1.0	J. R. Coulson J. R. Dogger S. W. T. Batra S. D. Hight ^{6/} R. F. W. Schroder J. J. Drea, Jr. A. C. F. Hung M. D. Huettel* D. L. Vincent ^{6/}

^{5/} Only taxonomists who are spending 1/4-1/2 time on research directly related to biological control are listed. Total SY figure includes effort of less than 0.25 SY expended by each of 19 other taxonomists on research related to biological control.

^{6/} Support professional.

* Effective October 1, 1984.

NORTHEASTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
<u>PLANT PROTECTION INSTITUTE</u>			
INSECT PATHOLOGY LABORATORY Bldg. 011A BARC-West Beltsville, Maryland 20705 FTS: 344-3689 COM: 301-344-3689	Identification, mode of action, safety, and pilot production of insect viruses, bacteria, and other microbial agents. Definition of media for insect cell cultures and multiplication in tissue cultures. NRP-20260.	9.5	J. R. Adams E. M. Dougherty R. M. Faust [S. J. Louloudes]+ D. E. Lynn G. J. Tompkins P. A. W. Martin <u>J. L. Vaughn</u>
Bldg. 465, BARC-East Beltsville, Maryland 20705 FTS: 344-2339 COM: 301-344-2339			R. F. Whitcomb T. B. Clark ++
NEMATOLOGY LABORATORY Bldg. 011A BARC-West Beltsville, Maryland 20705 FTS: 344-3064 COM: 301-344-3064	Biology, pathology and utilization of parasitic nematodes of insect pests. Isolation, identification, and evaluation of biological control agents of plant-parasitic nematodes. NRP-20270 and 20260.	0.5 1.0	W. R. Nickle R. M. Sayre
SOILBORNE DISEASES LABORATORY Bldg. 011A BARC-West Beltsville, Maryland 20705 FTS: 344-3682 COM: 301-344-3682	Research on biological, cultural, and integrated control of economically important soilborne plant diseases including use of micro-organisms and envi- ronmental modifications in their control. NRP-20270.	6.0	P. B. Adams W. A. Ayers J. A. Lewis R. D. Lumsden <u>G. C. Papavizas</u>
MYCOLOGY LABORATORY Bldg. 011A BARC-West Beltsville, Maryland 20705 FTS: 344-3364 COM: 301-344-2317	Taxonomic research and identification of fungi for use in biological control. NRP-20270.	0.3	F. A. Uecker <u>A. Y. Rossman</u>

+ It is with regret that we report the death of Dr. Louloudes on January 17, 1984.

++ It is with great regret that we must also report the death of Dr. Truman Clark on August 18, 1984.

NORTHEASTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
PLANT PATHOLOGY LABORATORY Bldg. 011, Range 1, HH 18 FTS: 344-3486 COM: 301-344-3486	Research on biological control of bean rust. NRP-20270.	0.4	C. J. Baker
Bldg. 004 FTS: 344-3600 COM: 301-344-3600	NRP 20020.	0.3	J. R. Stavely

BARC-West
Beltsville, Maryland 20705

HORTICULTURAL SCIENCE INSTITUTE

VEGETABLE LABORATORY Bldg. 470, BARC-East Beltsville, Maryland 20705 FTS: 344-2269 COM: 301-344-2269	Biological control of Colorado potato beetle, Mexican bean beetle, and mushroom insects. NRP-20220.	0.5	W. W. Cantelo G. E. Cantwell
FRUIT LABORATORY Bldg. 004, BARC-West Beltsville, Maryland 20705 FTS: 344-3569 COM: 301-344-3569	Research on use of phages as biocontrol agents against pathogens of stone fruits. NRP-20010.	0.3	E. L. Civerolo
FLORIST AND NURSERY CROPS LABORATORY Bldg. 470, BARC-East Beltsville, Maryland 20705 FTS: 344-4559 COM: 301-344-4559	Biological control of insect and mite pests of ornamentals. NRP-20220.	0.3	J. W. Neal, Jr.

OTHER LOCATIONS IN NORTHEASTERN REGION

BENEFICIAL INSECTS RESEARCH LABORATORY 501 South Chapel Street Newark, Delaware 19713 FTS: 487-6095 COM: 302-731-7330, 7331	National responsibility for quarantine receipt, culture, and distribution of exotic beneficial in- sects and mites of various insect and mite pests. Research on establishment and evaluation. NRP-20260.	5.0 1.0	W. H. Day R. J. Dysart R. W. Fuester R. M. Hendrickson P. W. Schaefer L. R. Ertle ^{6/}
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NORTHEASTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
PLANT DISEASE RESEARCH LABORATORY Fort Detrick, Bldg. 1301 Frederick, Maryland 21701 FTS: 935-7344 COM: 301-663-7344	Identification, study of host range, and use of exotic plant pathogens to control weeds, particularly composite thistles, leafy spurge, nutsedge, and species of dock. Plant pathogen quarantine activity. NRP-20260, 20270 and 20280.	1.2	W. L. Bruckart <u>W. M. Dowler</u>
INSECT NUTRITION, REARING, AND VIROLOGY RESEARCH ARS-USDA c/o APHIS-Otis Methods Development Center Building 1398 Otis AFB, Massachusetts 02542 FTS: 840-7209 COM: 617-563-9303	Gypsy moth virus production, strain selection, and formulation. NRP-20250.	1.0	M. Shapiro
INSECT PATHOLOGY RESEARCH UNIT, ARS-USDA c/o Boyce Thompson Institute Cornell University Tower Road Ithaca, New York 14853 FTS: 882-4228 COM: 607-257-2030	Repository and diagnostic center for fungal pathogens of insects. Research centered on development of Entomophorales as mycoinsecticides. Current projects include grasshoppers, locusts, spruce budworm, and aphids.	2.0	<u>R. S. Soper</u> <u>R. A. Humber</u>
NEMATODES RESEARCH UNIT USDA, ARS Dept. Plant Pathology Cornell University Ithaca, New York 14853 FTS: 882-4280 COM: 607-256-3106	Surveying for natural enemies of the potato cyst nematode. NRP-20270.	0.1	B. B. Brodie

NORTHEASTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
APPALACHIAN FRUIT RESEARCH STATION Route 2, Box 45 Kearneysville, West Virginia 25430 FTS: 925-5281 COM: 304-725-3451	Pathogens for controlling johnsongrass and dodder. Biological control of phytoparasitic nematodes associated with fruit production. NRP-20220 and 20280.	0.5	C. L. Wilson
NORTHEASTERN PLANT, SOIL AND WATER LABORATORY ARS, USDA University of Maine Orono, Maine 04469 FTS: 833-7475 COM: 207-581-3266	Development of biological methods as input into IPM systems for control of soilborne plant pathogens of potatoes. NRP-20020, 20260 and 20270.	0.3	S. S. Leach

----- NORTH CENTRAL REGION -----

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
FERMENTATION LABORATORY ARS-USDA Northern Regional Res. Ctr. 1815 N. University Street Peoria, Illinois 61604 FTS: 360-4358 COM: 309-685-4011, ext. 358	Microbial insecticides. <u>Bacillus thuringiensis.</u> NRP-20260.	1.3	<u>C. W. Hesseltine</u> <u>R. W. Detroy</u>
CORN INSECTS RESEARCH UNIT ARS-USDA Box 45B, RR# 3 Ankeny, Iowa 50021 FTS: 862-4758 COM: 515-284-4758	Formulation, application, and efficacy of <u>Nosema</u> for control of <u>Ostrinia nubilalis</u> and <u>Agrotis ipsilon.</u> Spectrum of activity of endotoxins produced by several varieties of <u>Bacillus thuringiensis.</u> NRP-20240.	1.0	L. C. Lewis
CEREAL AND SOYBEAN IMPROVEMENT RESEARCH UNIT ARS, USDA Bessey Hall Iowa State University Ames, Iowa 50011 FTS: 294-8412 COM: 515-294-8412	Research on biological control of pathogens of corn by use of introduced and native hyperparasitic fungi and other antagonists. NRP-20260.	0.2	N. G. Vakili
BIOLOGICAL RESEARCH UNIT U.S. Grain Marketing Research Center 1515 College Avenue Manhattan, Kansas 66502 FTS: 752-4705 COM: 913-539-9141	Use of entomopathogens to control insect pests in stored grain and processed products (wheat, corn, sorghum, and soybeans). NRP-20620.	1.5	<u>W. H. McGaughey</u> <u>D. E. Johnson</u>
ENTOMOLOGY AND SMALL GRAINS RESEARCH UNIT ARS-USDA Department of Entomology Michigan State University East Lansing, Michigan 48823 FTS: 373-0860 COM: 517-353-0860	Research on artificial rearing of Hessian fly for HPR in wheat and effect of insect infestations on winter hardiness of wheat. NRP-20240.	1.4	<u>S. G. Wellso</u>

NORTH CENTRAL REGION

<u>Laboratory</u>	<u>Main Effort - NRP</u>	<u>SY</u>	<u>Investigators</u>
SUGARBEETS AND EDIBLE LEGUMES RESEARCH UNIT ARS, USDA P.O. Box 1633 Michigan State University East Lansing, Michigan 48823 COM: 517-353-3221	Research on use of bacterial antagonists as control for several fungal and bacterial diseases of dry beans. NRP-20020.	0.2	A. W. Saettler
BIOLOGICAL CONTROL OF INSECTS RESEARCH LABORATORY ARS-USDA P.O. Box A Columbia, Missouri 65205 FTS: 276-5361 COM: 314-875-5361	Environmental effects on parasites, predators, and pathogens. Alternate methods of endoparasite propagation. Pathology of target pests, parasites, and predators and microbial control. Manipulations of parasite-predator populations. Population dynamics of parasites and predators and effects on host crops. Importation, screening, and biology of native and foreign parasites, predators, and pathogens. Parasite-predator behavior. NRP-20260.	8.0	C. M. Ignoffo D. L. Hostetter N. L. Marston B. Puttler A. H. McIntosh T. A. Coudron J. D. Wilkinson M. H. Greenstone
FORAGE AND RANGE RESEARCH UNIT Department of Agronomy 362 E. Plant Sciences Bldg. Lincoln, Nebraska 68583 FTS: 622-1546 COM: 402-472-1546	Insects and plant patho- gens for control of range and pasture weeds. NRP-20280.	0.6	M. K. McCarty
Department of Entomology 305 Industry Bldg. Lincoln, Nebraska 68583 FTS: 541-5267 COM: 402-472-2919	Alfalfa weevil parasites. NRP-20240.	1.0	G. R. Manglitz

NORTH CENTRAL REGION

<u>Laboratory</u>	<u>Main Effort - NRP</u>	<u>SY</u>	<u>Investigators</u>
LIVESTOCK INSECTS RESEARCH UNIT Department of Entomology 305 Plant Industry Bldg. East Campus Lincoln, Nebraska 68583 FTS: 541-5267 COM. 402-472-2918	Use of parasites for control of filth-breeding flies. NRP-20480.	0.5	J. J. Petersen G. D. Thomas
OILSEEDS RESEARCH UNIT Department of Entomology 257 Hultz Hall North Dakota State University Fargo, North Dakota 58105 COM: 701-237-7904	Natural enemies of sunflower pests. Biological control of <u>Cylindrocopturus</u> <u>adspersus</u> -stem weevil. NRP-20240.	0.3	L. D. Charlet
JAPANESE BEETLE RESEARCH LABORATORY, ARS-USDA Ohio Agricultural Research and Development Center Wooster, Ohio 44691 COM: 216-264-1021	Pathogens, parasites, and predators of the Japanese beetle. NRP-20220.	1.0	M. G. Klein <u>T. L. Ladd, Jr.</u>
NURSERY CROPS RESEARCH LABORATORY, ARS-USDA 359 Main Road Delaware, Ohio 43015 COM: 614-363-1120, 1129	Research on control of verticillium wilt of maple, and Dutch elm disease by use of introduced antagonists and resident microflora. NRP-20030.	0.3	T. J. Hall L. R. Schreiber
NORTHERN GRAIN INSECTS RESEARCH LABORATORY ARS-USDA R.R. 3 Brookings, South Dakota 57006 COM: 605-693-3241	Population dynamics of predators of cereal aphids, primarily coccinellids. NRP-20240. Predators of corn root- worms. NRP-20620. Pathogens (viruses) and nematodes of cutworms and other soil insects. NRP-20620.	0.2 1.0 0.2	R. W. Kieckhefer Vacancy <u>G. R. Sutter</u>

NORTH CENTRAL REGION

<u>Laboratory</u>	<u>Main Effort - NRP</u>	<u>SY</u>	<u>Investigators</u>
STORED PRODUCTS AND HOUSEHOLD INSECT UNIT ARS-USDA Dept. of Entomology University of Wisconsin Madison, Wisconsin 53706 FTS: 262-3795 COM: 608-262-3795	Biological control of <u>Trogoderma</u> spp. with the schizogregarine pathogen, <u>Mettesia trogodermae</u> . NRP-20620.	0.3	W. E. Burkholder
FRUIT AND VEGETABLE INSECTS RESEARCH UNIT 1118 Chestnut Street Vincennes, Indiana 47591 COM: 812-882-4942	Biological control of fruit and vegetable insects. NRP-20220.	0.5	<u>D. K. Reed</u> G. L. Reed
PLANT SCIENCE RESEARCH UNIT ARS-USDA Department of Plant Pathology Purdue University West Lafayette, Indiana 47907 COM: 317-749-6460	Research on gaeumannomyces biological control of fungi of oil seed crops. NRP-20080.	0.2	T. S. Abney

- - - - - SOUTHERN REGION - - - - -

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
RICE PRODUCTION AND WEED CONTROL UNIT P.O. Box 287 Stuttgart, Arkansas 72160 FTS: 740-5011 COM: 501-673-2661	Control of northern jointvetch and other weeds in rice with plant pathogens. NRP-20280.	0.2	<u>R. J. Smith, Jr.</u>
U.S. SUGARCANE FIELD STATION Star Route, Box 8 Canal Point, Florida 33438 COM. 305-924-5227	Biological control of sugarcane borer. NRP-20240.	0.3	O. Sosa, Jr.
AQUATIC WEED RESEARCH LABORATORY 3205 SW 70th Avenue Fort Lauderdale, Florida 33314 FTS: 820-7982 COM: 305-583-5541	Evaluating insects for control of aquatic weeds. NRP-20280.	1.0	T. D. Center K. K. Steward
BIOLOGICAL PEST CONTROL RESEARCH UNIT P.O. Box 1269 Gainesville, Florida 32602 FTS: 946-7271 COM: 904-372-3505	Biological control of aquatic weeds. Intro- duction and testing in quarantine of biotic agents for control of aquatic weeds. NRP-20260 and 20280.	1.0	<u>G. R. Buckingham</u>
INSECTS AFFECTING MAN AND ANIMALS RESEARCH LABORATORY P.O. Box 14565 Gainesville, Florida 32604 FTS: 947-7966, -7961, -7914, -7969, -7930, -7906, -7910, -7976, & -7910* COM: 904-374-5966, -5961, -5914, -5969, -5930, -5906, -5910, -5976 & -5910*	Collection and identifi- cation of pathogens of medical and agricultural insects and related organisms, including studies on host-pathogen relationships. Evaluation of pathogens, parasites and predators for control of medical and livestock insects. NRP-20850 and 20480.	3.0 3.9	<u>Pathogens:</u> A. L. Undeen L. A. Lacey D. P. Jouvenaz <u>Parasites:</u> P. B. Morgan D. A. Dame D. L. Bailey J. A. Hogsette D. A. Focks <u>R. S. Patterson</u>

*Listed in same order as
names of investigators.

SOUTHERN REGION

<u>Laboratory</u>	<u>Main Effort - NRP</u>	<u>SY</u>	<u>INVESTIGATORS</u>
INSECT ATTRACTANTS, BEHAVIOR, AND BASIC BIOLOGY RESEARCH LABORATORY P.O. Box 14565 Gainesville, Florida 32604 FTS: 947-7761, -7767 & -7763* COM: 904-374-5761, -5767 & -5763* *Listed in same order as names of investigators.	Studies on the acquisition, rearing, basic behavior, and manipulation of beneficial insects for use against the Caribbean fruit fly, <u>Heliothis</u> spp., <u>Spodoptera</u> spp., and almond moths. Develop and demonstrate methods for increasing the effectiveness of parasites and predators in insect pest management programs in field and vegetable crops and stored field crops. NRP-20250.	2.5	T. R. Ashley S. Ferkovich P. D. Greany W. J. Lewis*
U.S. HORTICULTURAL RESEARCH LABORATORY 2120 Camden Road Orlando, Florida 32803 FTS: 820-6051 COM: 305-898-6791	Biological control of citrus insects with emphasis on armored scales. <u>Diaprepes</u> <u>abbreviatus</u> root weevil control with an egg parasite. NRP-20220.	1.0	J. B. Beavers W. S. Schroeder
SOUTHEASTERN FRUIT AND TREE NUT RESEARCH STATION P.O. Box 87 Byron, Georgia 31008 FTS: 238-0421/22 COM: 912-956-5656	Evaluation of predators, pathogens, and parasites for control of pecan weevils, yellow and black pecan aphids, pecan spittlebugs, spider mites, and white peach scales. NRP-20220.	1.5	C. R. Gentry W. L. Tedders J. A. Payne C. E. Yonce
	Use of fungal and bacterial pathogens to control pecan insects. NRP-20010.	0.3	T. R. Gottwald
	Evaluate microorganisms as biocontrol agents of ring nematode on peach. NRP-20270.	0.2	A. P. Nyezeper
	Use of antagonistic bacteria for postharvest biological control of brown rot of stone fruit. NRP-20010.	0.2	P. L. Pusey

* Stationed at Tifton, Georgia; see p. 14.

SOUTHERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>INVESTIGATORS</u>
STORED PRODUCT INSECTS RESEARCH AND DEVELOPMENT LABORATORY 3401 Edwin Street P.O. Box 22909 Savannah, Georgia 31403 FTS: 248-4408 COM: 912-233-7981	Locate and identify para- sites and predators of stored-product insects, develop methods for rearing them, investigate their ecology, behavior and life history, evaluate their importance in natural control and their potential as biological control agents, and develop methods of augmentation. NRP-20620.	4.3	<u>R. Davis</u> R. T. Arbogast J. W. Press W. A. Bruce J. H. Brower D. W. Keever M. A. Mullen
GEORGIA COASTAL PLAIN EXPERIMENT STATION			
INSECT BIOLOGY AND POPULATION MANAGEMENT RESEARCH LABORATORY, ARS-USDA Tifton, Georgia 31793 FTS: 280-6478 COM: 912-386-6904	Evaluation and augmenta- tion methods of parasites, predators, and pathogens for control of <u>Heliothis</u> and other lepidopterous pests. NRP-20260 and NRP-20240.	3.5	<u>C. E. Rogers</u> W. J. Lewis* R. E. Lynch D. A. Nordlund J. J. Hamm H. R. Gross A. N. Sparks
FORAGE & TURF RESEARCH UNIT ARS-USDA Tifton, Georgia 31793 FTS: 230-6444/6445 COM: 912-386-8245	Search for <u>Trichoderma</u> spp. antagonistic to soil- borne plant pathogens. NRP-20100.	0.5	H. D. Wells
NEMATODE & WEED RESEARCH UNIT ARS-USDA Tifton, Georgia 31793 COM: 912-386-3372	Development of weed and nematode management and integrated pest management systems for the coastal plain. NRP-20280 and 20270.	0.2	N. C. Glaze C. C. Dowler <u>A. W. Johnson</u> N. A. Minton
U.S. SUGARCANE FIELD LABORATORY P.O. Box 470 Houma, Louisiana 70360 COM: 504-872-5042	Releases of imported parasites for control of sugar cane borer. NRP-20240.	0.5	S. D. Hensley

* Organizationally attached to Gainesville, Florida; see p. 13.

SOUTHERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>INVESTIGATORS</u>
GULF COAST MOSQUITO RESEARCH LABORATORY 803 Avenue J. Chenault Lake Charles, Louisiana 70601 FTS: 687-7204 COM: 318-433-0696/0697	Biological control of mosquitoes and other biting flies using pathogens and parasites. NRP-20480 and 20850.	2.0	<u>R. E. McLaughlin</u> <u>E. I. Hazard</u>
RICE EXPERIMENT STATION P.O. Box 1429 Crowley, Louisiana 70526 FTS: 687-6648 COM: 318-783-4373	Biological control of arthropods attacking rice. NRP-20240.	0.1	J. F. Robinson
BOLL WEEVIL RESEARCH LABORATORY P.O. Box 5367 Mississippi State, Mississippi 39762 FTS: 490-4676 COM: 601-323-2230	Rearing and behavior of parasites and hyperpara- sites of the boll weevil. Development of methods for use of biological control agents on cotton pests. NRP-20230.	0.3	[W. H. Cross]+ W. L. McGovern
SOUTHERN FIELD CROP INSECT MANAGEMENT LABORATORY Delta States Research Center P.O. Box 225 Stoneville, Mississippi 38776 FTS: 497-2231 COM: 601-686-2311 ext. 231 or 232	Establish principles for encouraging and using parasites and predators more effectively. Includes introduction, quarantine and release; evaluation and conservation; and augmentation of parasites and predators of field crop pests. NRP-20230, 20240, 20260.	4.4	<u>E. G. King, Jr.</u> <u>J. W. Smith</u> E. Stadelbacher W. Jones J. E. Powell W. W. Harrison <u>6/</u> K. R. Hopper

+ We regret to report the death of Dr. Cross in May 1984.

SOUTHERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>INVESTIGATORS</u>
BIOLOGICAL WEED CONTROL RESEARCH UNIT Southern Weed Science Laboratory P.O. Box 225 Stoneville, Mississippi 38776 FTS: 497-2243 COM: 601-686-2311 ext. 243/216/221/222	Survey and evaluate native and exotic plant pathogens and insects that attack weeds in the South. Integrated weed management systems for spurred anoda, nutsedge, johnsongrass, water-hyacinth, alligatorweed, and other weeds of field crops, pastures, and waterways. NRP-20280.	3.0	<u>P. C. Quimby</u> <u>H. L. Walker</u> N. R. Spencer
TOBACCO RESEARCH LABORATORY ARS-USDA Route 2, Box 16 G Oxford, North Carolina 27565 COM: 919-693-5151	Control of foliar plant diseases by antagonistic microorganisms. NRP-20120. Predators, parasites, and pathogens for control of tobacco insects. NRP 20230 and 20880.	0.8 1.5	H. W. Spurr, Jr. [<u>A. H. Baumhover</u>]* <u>D. M. Jackson</u> J. J. Lam, Jr.
WHEAT AND OTHER CEREAL CROPS UNIT Plant Science & Water Conservation Laboratory P.O. Box 1029 Stillwater, Oklahoma 74076 FTS: 728-4231 COM: 405-624-4212	Rearing and release of native and imported parasitoids of aphids attacking cereals. NRP-20240. Epidemiology and biocontrol of wheat leaf rust, Septoria and tan spot.	0.3 0.2	K. J. Starks <u>R. L. Burton</u> J. A. Webster F. J. Gough
U.S. VEGETABLE LABORATORY USDA-ARS-SR 2875 Savannah Highway Charleston, South Carolina 29407 FTS: 677-4746 COM: 803-556-2210	Cultivation <u>in vitro</u> of a mermithid parasite of banded cucumber beetle. NRP-20270 and 20220. Parasites, predators, and pathogens for control of vegetable insects. NRP-20220.	0.4 1.0	G. Fassuliotis C. S. Creighton <u>J. M. Schalk</u> <u>C. S. Creighton</u> K. D. Elsey

* Dr. Baumhover retired July 1974.

SOUTHERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>INVESTIGATORS</u>
SOUTHEAST COTTON PRODUCTION RESEARCH UNIT P.O. Box 2131 Florence, South Carolina 29503 FTS: 677-3321 COM: 803-669-6664	Survey for biological control agents of <u>Heliothis zea</u> and <u>H.</u> <u>virescens</u> on cotton and other host plants. Evaluation of pathogens for control of <u>Heliothis</u> and <u>Anthonomus grandis</u> on cotton. NRP-20230.	1.0	A. R. Hopkins <u>R. F. Moore</u> S. H. Roach
COTTON INSECTS RESEARCH UNIT Oklahoma-Texas Area P.O. Box 1033 Brownsville, Texas 78520 FTS: 734-8214 COM: 512-542-2516	Screening, development, evaluation, and production of entomopathogenic and toxin producing micro- organisms for insect con- trol. Majority of effort is on <u>Bacillus thuringiensis</u> and actinomycetes. NRP-20260.	1.5	H. T. Dulmage <u>C. C. Beegle</u> G. Donaldson
COTTON INSECTS RESEARCH LABORATORY P.O. Drawer DG College Station, Texas 77840 FTS: 527-1353 COM: 713-846-8821, ext. 351	Mass production, behavior, augmentation, and popula- tion dynamics of parasites and predators of <u>Heliothis</u> . Nuclear polyhedrosis virus of <u>Heliothis</u> . NRP-20230 and 20260.	2.8	R. K. Morrison <u>D. L. Bull</u> T. N. Shaver J. D. Lopez W. C. Nettles, Jr.
VETERINARY TOXICOLOGY AND ENTOMOLOGY RESEARCH LABORATORY P.O. Drawer GE College Station, Texas 77840 FTS: 527-1317 COM: 713-260-9317	Biology, ecology, and mass production of competitors (manure-breeding scarabs), predators, and parasites for control of horn flies and face flies. NRP-20480.	5.0	R. L. Harris <u>R. R. Blume</u> G. T. Fincher J. W. Summerlin J. P. Roth
NATIONAL COTTON PATHOLOGY RESEARCH LABORATORY P.O. Drawer JF College Station, Texas 77841 FTS: 527-1232 COM: 713-846-8821	Biological control of <u>Rhizoctonia</u> and <u>Pythium</u> diseases of cotton. NRP-20062.	0.8	C. R. Howell

SOUTHERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>INVESTIGATORS</u>
GRASSLAND PROTECTION RESEARCH UNIT Department of Range Science Texas A&M University College Station, Texas 77841 FTS: 527-1238 COM: 713-260-9238	Evaluates proposed releases of exotic natural enemies of weeds in the U.S. as Chairman, Working Group on Biological Control of Weeds. NRP-20280.	0.1	<u>R. W. Bovey</u>
U.S. LIVESTOCK INSECTS LABORATORY P.O. Box 232 Kerrville, Texas 78028 COM: 512-257-3566	Pathogens for control of livestock pests. NRP-20480.	0.2	K. B. Temeyer
GRASSLAND, SOIL, AND WATER RESEARCH LABORATORY P.O. Box 748 Temple, Texas 76501 FTS: 736-1201 COM: 817-774-1201	Biological control of native and introduced weeds and brush plants of rangelands, particularly in the southwestern U.S., by introducing insects, plant pathogens, mites, and nematodes from overseas, especially from southern South America. NRP-20260.	2.0	C. J. DeLoach P. E. Boldt H. B. Johnson
SUBTROPICAL CROP INSECTS RESEARCH UNIT 509 West Fourth Street Weslaco, Texas 78596 COM: 512-968-3159/50	Biological control of soft and armored scales, white- flies, mealybugs and mites of citrus using hymenopte- rous parasites and preda- tors introduced from citrus areas worldwide. Rearing pests and their hymenopte- rous parasites. Biological control of Mediterranean fruit fly and Mexican fruit fly with introduced hymenop- terous parasites. NRP-20220.	3.3	<u>W. G. Hart</u> <u>R. H. Rhode</u> K. R. Summy

----- WESTERN REGION -----

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
BIOLOGICAL CONTROL OF INSECTS LABORATORY 2000 East Allen Road Tucson, Arizona 85719 FTS: 762-6220 COM: 602-629-6220	Rearing, nutrition, and mass production; inocula- tive and programmed releases of native and imported parasites and predators for control of <u>Lygus</u> spp., <u>Heliothis</u> spp., <u>Spodoptera</u> spp. NRP-20260 and 20230.	3.0 2.0	<u>H. M. Graham</u> <u>C. G. Jackson</u> R. Patana A. C. Cohen J. W. Debolt
WESTERN COTTON RESEARCH LABORATORY 4135 East Broadway Road Phoenix, Arizona 85040 FTS: 261-3524 COM: 602-261-3524	Evaluation of various pathogens and parasites for control of pink boll- worms and <u>Heliothis</u> spp. NRP-20230.	1.5	M. R. Bell G. D. Butler, Jr.
BIOLOGICAL CONTROL OF WEEDS RESEARCH LABORATORY 1050 San Pablo Avenue Albany, California 94706 FTS: 449-3757 COM: 415-486-3757	Introduction, testing, and dissemination of insects for control of weeds. NRP-20260 and 20280.	4.0 2.0	<u>L. A. Andres</u> <u>D. M. Maddox</u> R. W. Pemberton S. S. Rosenthal A. H. Krueger ^{6/} C. E. Turner
380 Hutchinson Hall University of California, Davis Davis, California 95616 FTS: 453-0309 COM: 916-752-0309	Study and implementation of plant pathogens for weed control. NRP-20260.	1.0	J. M. Klisiewicz
AQUATIC WEEDS RESEARCH LABORATORY University of California Davis, California 95616 COM: 916-752-6260	Plant competitors, allelopathy, plant pathogens, and fish for aquatic weed control. NRP-20280.	1.5	R. R. Yeo <u>L. W. Anderson</u>
CROPS PATHOLOGY RESEARCH UNIT Plant Pathology Department University of California Davis, California 95616 FTS: 453-0322 COM: 916-752-0322	Suppression of <u>Phytophthora</u> by modifica- tion of soil microflora. NRP-20010. Control of <u>Verticillium</u> through use of soil antagonists. NRP-20270.	0.1 0.1	J. S. M. Mircetich W. C. Schnathorst

WESTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
HORTICULTURAL CROPS RESEARCH LABORATORY Ecology and Biological Control Research Unit 5578 Air Terminal Drive Fresno, California 93727 FTS: 467-5310, 5311, 5338 COM: 209-487-5310	Development of insect pathogens for control of postharvest pests. NRP-20260 and 20620. Use of insect pathogens and nematodes for control of insect pests of vegetable and tree fruit crops. NRP-20260. Determine efficacy of pathogens for the control of quarantine and horticultural insect pests. NRP-20260 and 20620.	3.0	W. R. Kellen P. V. Vail J. E. Lindegren R. E. Rij
BOYDEN FRUIT AND VEGETABLE RESEARCH LABORATORY Riverside, California 92521 FTS: 796-1592 COM: 714-787-1592	Viruses for control of citrus red mite. NRP-20220. Biological control of vectors: beet leafhopper, melon aphid and sweetpotato whitefly. NRP-20220.	0.5 0.5	D. E. Meyerdirk D. S. Moreno D. L. Coudriet
TROPICAL FRUIT AND VEGETABLE RESEARCH LABORATORY			
FRUIT FLY BIOLOGY AND ECOLOGY RESEARCH UNIT P.O. Box 2280 Honolulu, Hawaii 96804 COM: 808-988-2158	Field studies of parasite behavior to improve inundative release of parasites for control of fruit flies. NRP-20220. Laboratory and field studies of host preference and interspecific competition of parasites to improve biological control of fruit flies. NRP-20220.	0.3 0.3	T. T. Y. Wong E. J. Harris

WESTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
FRUIT FLY REARING CONTAINMENT AND CONTROL RESEARCH UNIT P.O. Box 2280 Honolulu, Hawaii 96804 COM: 808-988-2158	Development of biological control systems complementary to sterile male release techniques, including production and use of parasites and other biocontrol agents. NRP-20220.	0.2 0.1	R. I. Vargas R. T. Cunningham
RANGELAND INSECTS LABORATORY Montana State University Bozeman, Montana 59715 FTS: 585-4220 COM: 406-994-3344	Pathogens and parasites for control of grass- hoppers on rangeland. NRP-20240. Biology and dissemination of insects for biological control of weeds on range- land. NRP-20240.	1.8 0.4	J. E. Henry N. E. Rees R. H. Goodwin N. E. Rees
SUGARBEET PRODUCTION RESEARCH UNIT, ARS Crops Research Laboratory Colorado State University Fort Collins, Colorado 80523 COM: 303-482-7717	Research on biocontrol of pathogens of sugarbeet. NRP-20090.	0.2	E. G. Ruppel
IRRIGATED AGRICULTURE RESEARCH & EXTENSION CENTER			
VEGETABLE CROPS PRODUCTION UNIT P.O. Box 30 Prosser, Washington 99350 FTS: 445-1502 COM: 509-335-1502	Control of soilborne diseases, dry beans and peas. Mechanisms of <u>Fusarium</u> suppressive soils. NRP-20270.	0.2	<u>J. M. Kraft</u>
WEED RESEARCH UNIT P.O. Box 30 Prosser, Washington 99350 COM: 509-786-3454	Development of integrated weed management systems for cropland and ditch- bank situations, involving use of competitive plants.	1.0	<u>J. H. Dawson</u> <u>R. D. Comes</u> A. G. Ogg, Jr.

WESTERN REGION

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY</u>	<u>Investigators</u>
NORTHWEST CEREAL DISEASE LABORATORY 59 Johnson Hall Washington State University Pullman, Washington 99163 COM: 509-335-3632	Biological control of wheat root diseases and soilborne plant pathogens. NRP-20270 and 20050.	1.5	R. J. Cook D. M. Weller
YAKIMA AGRICULTURAL RESEARCH LABORATORY 3706 West Nob Hill Blvd. Yakima, Washington 98902 FTS: 446-5982 COM: 509-575-5982	Implementation of biological controls of insects of vegetables. NRP-20220.	0.2	J. E. Halfhill
FTS: 446-5986 COM: 509-575-5986	Survey for biological control of agents of climbing cutworm on deciduous fruits. NRP-20220.	0.2	J. F. Howell
FTS: 446-5959 COM: 509-575-5959	Pear psylla - biological control and ecology. NRP-20220.	0.8	J. L. Krysan*
ORNAMENTAL PLANTS RESEARCH LABORATORY 3420 SW Orchard Street Oregon State University Corvallis, Oregon 97330 FTS: 420-4824 COM: 503-757-4544	Research on suppressive nature of composted nursery potting mixes to <u>Phytophthora</u> root rot and use of mycorrhizae for improved health of ornamental plants. NRP-20270.	0.5	R. G. Linderman

* Effective October 1, 1984.

II. ROSTER OF FOREST SERVICE BIOLOGICAL CONTROL WORKERS*

<u>Laboratory</u>	<u>Biological Control Related Activities</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
<u>PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION</u>			
RANGE AND WILDLIFE LABORATORY C Ave. and Gekeler Lane Rt. 2, Box 2315 LaGrande, Oregon 97850 FTS: 963-7122 COM: 503-963-7122	Research Work Unit PNW-2201: Research on biological control of western forest tree defoliators with parasites and predators.	2.0	<u>B. E. Wickman</u> <u>R. B. Ryan</u> T. R. Torgersen
FORESTRY SCIENCES LABORATORY 3200 Jefferson Way Corvallis, Oregon 97331 FTS: 420-4382 COM: 503-757-4334	Research Work Unit PNW-2204: Research on microbial control of western forest tree defoliators. Research Work Unit PNW-2210: Research on biological control of root rots with antagonistic micro- organisms.	2.0 0.4	<u>G. E. Daterman</u> <u>M. E. Martignoni</u> M. J. Stelzer <u>J. M. Trappe</u> E. E. Nelson W. G. Thies
INSTITUTE OF NORTHERN FORESTRY Fairbanks, Alaska 99701 FTS: 474-7443 COM: 907-474-7443	Research Work Unit PNW-1651: Research on biological control of western forest tree defoliators with parasites, predators, and pathogens.	0.2 •	<u>C. T. Dyrness</u> <u>J. S. Hard</u> R. A. Werner
<u>PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION</u>			
USDA FOREST SERVICE 1960 Addison Street Box 245 Berkeley, California 94701 FTS: 449-3154 COM: 415-486-3154	Research Work Unit PSW-2205: Research on biological control of dwarf mistletoe with pathogens, and biological and non-chemical control of conifer seedling diseases.	0.6	<u>R. V. Bega</u> R. F. Scharpf

1/ Scientist/year spent on biological control related activities.

2/ Research Leader or Location Leader underlined.

*Prepared by Forest Insect and Disease Research, Forest Service, USDA, Washington, D.C.

FOREST SERVICE

<u>Laboratory</u>	<u>Biological Control Related Activities</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
	Research Work Unit PSW-2208: Field tests to maximize efficacy of <u>Bacillus thuringiensis</u> (Bt) on western spruce budworm; research on safety of chemical treatment strategies for control of western forest insects on nontarget organisms.	0.5	<u>M. I. Harverty</u> <u>P. J. Shea</u>
	Research Work Unit PSW-2209: Laboratory research on impact of insecticides on primary larval parasites of major western forest tree defoliators.	1.0	<u>J. L. Robertson</u> <u>L. E. Greene</u>
INSTITUTE OF PACIFIC ISLAND FORESTRY 1151 Punchbowl Street Room 323 Honolulu, Hawaii 96813 FTS: 546-5669 COM: 808-546-5669	Research Work Unit PSW-2207: Research on biological control of noxious weeds with pathogens and insects.	1.6	<u>C. S. Hodges, Jr.</u> <u>G. P. Markin</u>
<u>INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION</u>			
FORESTRY SCIENCES LABORATORY 1221 South Main Moscow, Idaho 83843 FTS: 554-1111 COM: 208-882-3557	Research Work Unit INT-1252: Research on biological control of root rots with antagonistic micro- organisms.	0.5	<u>A. E. Harvey</u>
<u>ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION</u>			
FORESTRY SCIENCES LABORATORY East Campus University of Nebraska Lincoln, Nebraska 68583 FTS: 541-5178 COM: 402-471-5178	Research Work Unit RM-2251: Research on natural enemies of insect pests damaging Great Plains plantings (shelterbelts, etc.).	0.2	<u>G. W. Peterson</u> <u>M. E. Dix</u>

FOREST SERVICE

<u>Laboratory</u>	<u>Biological Control Related Activities</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
<u>NORTH CENTRAL FOREST EXPERIMENT STATION</u>			
FORESTRY SCIENCES LABORATORY Stephen S. Nisbet Bldg. 1407 S. Harrison Road Michigan State University East Lansing, Michigan 48823 FTS: 355-7740 COM: 517-355-7740	Research Work Unit NC-2203: Ecology and physiology of disease- causing organisms for control of important forest insects.	1.1	<u>L. F. Wilson</u> <u>L. S. Bauer</u>
<u>NORTHEASTERN FOREST EXPERIMENT STATION</u>			
CENTER FOR BIOLOGICAL CONTROL OF EASTERN FOREST INSECT AND DISEASE PESTS 51 Mill Pond Road Hamden, Connecticut 06514 FTS: 645-2021 COM: 203-773-2021	Research Work Unit NE-2201: Research on biological control tactics and strategies (parasites and predators) for northeastern hardwood insects.	1.5	<u>W. E. Wallner</u> <u>T. M. ODell</u> <u>H. R. Smith</u>
	Research Work Unit NE-2202: Research to improve selected insect pathogens (Bt and viruses) and develop and improve formulation and application technology; epizootiology of viruses.	4.0	<u>F. B. Lewis</u> <u>N. R. DuBois</u> <u>J. D. Podgwaite</u> <u>K. S. Shields</u>
	Research Work Unit NE-2210: Research on biological control of beech bark disease with microorganisms.	0.5	<u>D. R. Houston</u>
FORESTRY SCIENCES LABORATORY Box 365 Delaware, Ohio 43015 FTS: 975-9309 COM: 614-369-4471	Research Work Unit NE-2209: Research on biological control of Dutch elm disease (DED) with antagonistic micro- organisms; research on microbial control of the DED vector (elm bark beetles).	2.0	<u>G. F. Gregory</u> <u>J. H. Barger</u> <u>W. N. Cannon, Jr.</u> <u>H. M. Mazzone 3/</u>

3/ Located at Hamden, Connecticut, Center for Biological Control of Eastern Forest Insect and Disease Pests.

FOREST SERVICE

<u>Laboratory</u>	<u>Biological Control Related Activities</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
USDA BUILDING University of Maine Orono, Maine 04469 FTS: 833-7388 COM: 207-866-4140	Research Work Unit NE-1151: Research on the relationship between forest stand management strategies (silviculture) and mortality of spruce budworm due to natural enemies (predators and parasites); identify forest management practices that enhance natural enemy populations.	1.0	<u>B. M. Blum</u> <u>D. T. Jennings</u>
<u>SOUTHEASTERN FOREST EXPERIMENT STATION</u>			
FORESTRY SCIENCES LABORATORY Carlton Street Athens, Georgia 30602 FTS: 250-2455 COM: 404-546-2455	Research Work Unit SE-2211: Research on biological control of pitch canker using antagonistic micro- organisms.	1.0	<u>H. R. Powers, Jr.</u> <u>J. B. Barrows-</u> Broadus
SCHOOL OF FOREST RESOURCES AND CONSERVATION University of Florida Gainesville, Florida 32611 FTS: 946-7261 COM: 904-392-4826	Research Work Unit SE-2252: Research on parasites of southeastern forest insect pests.	1.0	<u>T. Miller</u> <u>A. T. Drooz 4/</u>
<u>SOUTHERN FOREST EXPERIMENT STATION</u>			
ALEXANDRIA FORESTRY CENTER 2500 Shreveport Hwy. Pineville, Louisiana 71360 FTS: 497-7232 COM: 318-473-7232	Research Work Unit SO-2203: Research on (1) impact of insect parasites on populations of southern pine beetle (SPB), (2) effect of mite associates on SPB populations, and (3) effect of nematodes on SPB populations.	3.0	<u>P. L. Lorio</u> <u>D. N. Kinn</u> <u>M. C. Miller</u> <u>J. C. Moser</u>

4/ Located at Olustee, Florida, P.O. Box 70, 32070; FTS: 946-2846; COM: 904-752-0331.

FOREST SERVICE

<u>Laboratory</u>	<u>Biological Control Related Activities-NRP</u>	<u>SY 1/</u>	<u>Investigators 2/</u>
SOUTHERN HARDWOODS LABORATORY Box 227 Stoneville, Mississippi 38726 FTS: 497-2404 COM: 601-686-7218	Research Work Unit SO-2209: Research on natural control of hardwood borers (parasites and pathogens).	0.1	<u>T. H. Filer</u> <u>J. D. Solomon</u>
<u>FOREST PRODUCTS LABORATORY</u>			
FOREST PRODUCTS LABORATORY Gifford Pinchot Drive Box 5130 Madison, Wisconsin 53705 FTS: 364-5610 COM: 608-264-5610	Research Work Unit FPL-2202: Research on biological control of wood decay with antagonistic micro- organisms.		<u>W. E. Eslyn</u> <u>T. L. Highley</u>
<u>FOREST PEST MANAGEMENT</u>			
USDA FOREST SERVICE P. O. Box 2417 Room 204-RPD Washington, D.C. 20013 FTS: 235-1560 COM: 703-235-1560	Biological control of forest pests.		<u>J. L. Stewart</u>
VIRUS PRODUCTION UNIT USDA Forest Service 3200 Jefferson Way Corvallis, Oregon 97331 FTS: 420-4352 COM: 503-757-4352	Production of Douglas-fir tussock moth virus.		<u>D. W. Scott</u>

III. ORGANIZATIONS INVOLVED IN COORDINATING AND/OR PROVIDING INFORMATION
ON BIOLOGICAL CONTROL ACTIVITIES IN THE U.S.

A. USDA Offices

Office of International Cooperation and Development (OICD)

Associate Administrator: R. P. Scherle (South Bldg., 14th &
Independence Avenue, Washington, D.C. 20250)

Agricultural Research Service (ARS)

Assistant to the Administrator for International Activities:

B. M. KOPACZ (Bldg. 005, Beltsville Agricultural Research
Center-West, Beltsville, Maryland 20705)

National Program Staff, Biological Control Team:

(Bldg. 005, Beltsville Agricultural Research Center-West,
Beltsville, Maryland 20705). Team Members include the following
National Program Leaders (NPLs): R. A. BRAM, NPL-Insects of Man and
Animals; R. D. JACKSON, Entomology; M. T. OUYE, NPL-Postharvest Product
Losses; W. C. SHAW, NPL-Weed Science; and H. E. WATERWORTH, NPL-Plant
Health.

ARS Biological Control Documentation Center, Beneficial Insect
Introduction Laboratory, IIBIII: J. R. COULSON, Chief
(Bldg. 264, Beltsville Agricultural Research Center-East,
Beltsville, Maryland 20705)

Animal and Plant Health Inspection Service (APHIS) - Plant Protection and
Quarantine (PPQ)

National Biological Control Program: G. L. CUNNINGHAM, Senior Staff Officer
Technology Analysis and Development Staff (Federal Bldg.,
6505 Belcrest Road, Hyattsville, Maryland 20782); L. E. WENDEL,
Laboratory Director, Mission Biological Control Laboratory, (P.O. Box 787,
Mission, Texas 78572); T. L. BURGER, Laboratory Director, Niles Biological
Control Laboratory (2534 South 11th Street, Niles, Michigan 49120)

International Programs: G. G. ROHWER, Assistant Deputy Administrator,
International Programs (Administration Bldg., U.S. Department of
Agriculture, 14th & Independence Avenue, Washington, D.C. 20250)

Field Operations Support Staff: E. J. STUBBS, Senior Staff Officer, Technology
Analysis and Development Staff (Federal Bldg., 6505 Belcrest Road,
Hyattsville, Maryland 20782)

Biological Assessment Support Staff: J. W. LIGHTFIELD, Assistant Director,
National Program Planning Staff (Federal Bldg., 6505 Belcrest Road,
Hyattsville, Maryland 20782)

Cooperative States Research Service (CSRS)

Plant Sciences Group: R. C. RILEY, K. P. DORSCHNER, and J. R. FULKERSON, Staff Scientists for Entomology, Weed Science, and Plant Pathology, respectively (West Auditors Bldg., U.S. Department of Agriculture, 14th & Independence Avenue, Washington, D.C. 20250)

Forest Service (FS)

International Forestry: R. W. BRANDT*, Director (South Bldg., U.S. Department of Agriculture, 14th & Independence Avenue, Washington, D.C. 20250)

Forest Insect and Disease Research: G. W. ANDERSON, Chief (P.O. Box 2417, U.S. Department of Agriculture, Washington, D.C. 20013)

USDA Weed Committee: W. C. SHAW, Chairman (National Program Staff, Agricultural Research Service, U.S. Department of Agriculture, Bldg. 005, Beltsville Agriculture Research Center-West, Beltsville, Maryland 20705)

- (a) Working Group on Biological Control of Weeds: R. W. BOVEY, Chairman (ARS, USDA, Department of Range Science, Texas A&M University, College Station, Texas 77841). See Working Group Guidelines published in Weed Science 30: 661-667, 1982, and Plant Disease 66: 1205-1209, 1982.
- (b) Working Group on Integrated Weed Management Systems: K. P. DORSCHNER, Chairman (Cooperative States Research Service, U.S. Department of Agriculture, South Bldg., U.S. Department of Agriculture, 14th & Independence Avenue, Washington, D.C. 20250)

ARS-Southern Region Advisory Committee on Biological Control:

E. G. KING, JR., Chairman (Southern Field Crop Insect Management Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Delta States Research Center, P.O. Box 225, Stoneville, Mississippi 38776)

ARS-Northeastern Region Committee on Natural Enemies: L. KNUTSON, Chairman (Insect Identification and Beneficial Insect Introduction Institute, Agricultural Research Service, U.S. Department of Agriculture, Bldg. 003, Beltsville Agricultural Research Center-West, Beltsville, Maryland 20705)

APHIS Biological Control Technical Advisory Group: R. L. WILLIAMSON, Chairman (National Program Planning Staff, Plant Protection and Quarantine, Animal and Plant Health Inspection Service, U.S. Department of Agriculture, Federal Bldg., 6505 Belcrest Road, Hyattsville, Maryland 20782)

* Dr. Brandt retired August 1984.

B. Non-Federal Offices

Consortium for Integrated Pest Management: P. L. ADKISSON, Project Director (Vice President for Agriculture, Texas A&M University, College Station, Texas 77840)

International Organization of Biological Control, Western Hemisphere Regional Section: H. C. CHIANG, President (Department of Entomology, Fisheries and Wildlife, University of Minnesota, St. Paul, Minnesota 55108)

Inter-society Consortium for Plant Protection, Biological Control Committee: R. CHARUDATTAN, Chairman (Plant Pathology Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida 32611)

Southeastern Biological Control Working Group: D. A. NORDLUND, President (Georgia Coastal Plain Experiment Station, Insect Biology and Population Management Research Laboratory, Tifton, Georgia 31793)

Biological Weed Control Committee, Weed Science Society of America: A. K. WATSON, Chairman (Macdonald Campus, McGill University, 21,111 Lakeshore Road, Ste. Anne de Bellevue, Quebec, Canada H9X 1C0)

Consortium for International Crop Protection: R. F. SMITH, Executive Director (2288 Fulton Street, Suite 310, Berkeley, California 94704)

Biological Control Committee, American Phytopathological Society: D. S. KENNEY, Chairman (Abbott Laboratories, 36 Oakwood Road, Long Grove, Illinois 60047)

Livestock Insects Biocontrol Coordinating Group: R. S. PATTERSON and D. A. RUTZ, Co-chairmen (Insects Affecting Man and Animals Research Laboratory, Agriculture Research Service, U.S. Department of Agriculture, 1200 SW 23rd Drive, P.O. Box 14565, Gainesville, Florida 32604; and Department of Entomology, Cornell University, Ithaca, New York 14853; respectively)

IV. SOURCES OF INFORMATION ABOUT BIOLOGICAL CONTROL

Information Systems Division, National Agricultural Library, ARS, USDA, 10301
Baltimore Blvd., Beltsville, Maryland 20705

ARS Biological Control Documentation Center: J. R. COULSON, Beneficial Insect
Introduction Laboratory, (Insect Identification and Beneficial Insect
Introduction Institute, Bldg. 264, Beltsville Agricultural Research
Center-East, Beltsville, Maryland 20705)

Biological Control Projects in Plant Pathology - A Directory: CHARUDATTAN, R.
Plant Pathology Department (Institute of Food and Agricultural Sciences,
University of Florida, Gainesville, Florida 32611)

Information Center, Biological Control Services Program, California Department of
Food and Agriculture: L. G. BEZARK, (3288 Meadowview Rd., Sacramento,
California 95832)

Aquatic Weed Program, International Plant Protection Center (IPPC),
3103 McCarty Hall, University of Florida, Gainesville, Florida 32611
(Bibliographic searches on biological control of aquatic weeds)

Central Information Service, Commonwealth Scientific and Industrial Research
Organization (CSIRO), 314 Albert Street (P.O. Box 89), East Melbourne,
Victoria, Australia 3002

Information Service, Commonwealth Institute of Biological Control (CIBC),
56 Queen's Gate, London, SW7 5JR, U.K.

Please Note: We would particularly like to receive your recommendations for
additional sources of information.

In future editions of this document, we plan to include a list of all data bases
relevant to biological control that exist within ARS and which are available to
research scientists. If you have such a data base and would like it added to this
list, please provide the following information:

Database Manager - _____
Address - _____

Database title _____
Type of Database - ☐ Computerized ☐ Printed (Published? ☐) ☐ Other
(Give references) (Explain)

Type of computer, if computerized - _____
Accessibility - ☐ Restricted ☐ Unrestricted
Inquiries accepted - ☐ on line ☐ in writing ☐ by telephone
Brief description of contents - _____

V. FACILITIES CURRENTLY SERVING AS QUARANTINE RECEIVING CENTERS FOR EXOTIC BENEFICIAL ORGANISMS IN THE UNITED STATES

Note: Unless indicated otherwise, all units conduct quarantine clearance and study of the organisms listed, including further shipment and field release (when cleared by Federal and State officials).

A. USDA Facilities

<u>Laboratory</u>	<u>Mission - Types of Organisms</u>	<u>Responsible Persons</u>
1. BIOLOGICAL CONTROL OF WEEDS RESEARCH LABORATORY, ARS-WR 1050 San Pablo Avenue Albany, California 94706 Telephone: 415-486-3757 FTS: 449-3757	Exotic weed-feeding arthropods.	L. A. Andres, Research Leader A. H. Krueger, Quarantine Officer
2. BEE BIOLOGY AND SYSTEMATICS LABORATORY, ARS-WR UMC-53 Utah State University Logan, Utah 84322 Telephone: 801-750-2525 Ext. 7493 FTS: 586-2525	Exotic pollinating insects.	F. D. Parker, Research Leader D. F. Veirs, Jr., Quarantine Officer
3. QUARANTINE FACILITY GRASSLAND, SOIL AND WATER LABORATORY, ARS-SR P.O. Box 748 Temple, Texas 76501 Telephone: 817-774-1201 FTS: 736-1201	Exotic arthropods for control of brush and range weeds.	R. W. Bovey, Research Leader C. J. DeLoach, Research Entomol. P. E. Boldt, Quarantine Officer
4. VETERINARY TOXICOLOGY AND ENTOMOLOGY RESEARCH LABORATORY, ARS-SR P.O. Drawer GE College Station, Texas 77840 Telephone: 713-846-8821 FTS: 527-1317 527-1324	Exotic dung beetles for control of dung-inhabiting flies.	R. L. Harris, Research Leader G. T. Fincher, Quarantine Officer

<u>Laboratory</u>	<u>Mission - Types of Organisms</u>	<u>Responsible Persons</u>
5. BIOLOGICAL CONTROL OF INSECTS RESEARCH LABORATORY, ARS-NCR P.O. Box A Columbia, Missouri 65205 Telephone: 314-875-5361 FTS: 276-5361	Exotic arthropod parasites and predators of arthropod pests. <u>Also:</u> Receipt and diagnosis of exotic entomopathogens.	C. M. Ignoffo, Research Leader B. Puttler, Quarantine Officer
6. STONEVILLE RESEARCH QUARANTINE FACILITY, ARS-SR U.S. Delta States Agricultural Research Ctr. P. O. Box 225 Stoneville, MS 38776 Telephone: 601-686-2311 FTS: 497-2282	Exotic natural enemies of arthropod pests, and exotic weed-feeding arthropods. Study of endemic plant pathogens for weed control.	E. G. King, Jr., Laboratory Chief W. A. Jones, Research Entomol. C. G. McWhorter, Laboratory Chief P. C. Quimby, Jr., Research Leader W. W. Harrison, Quarantine Officer
7. BIOLOGICAL PEST CONTROL RESEARCH UNIT, ARS-SR P.O. Box 1269 Gainesville, FL 32602 Telephone: 904-372-3505 FTS: 946-7271	See B 6.	G. R. Buckingham, Research Entomol. C. A. Bennett, Quarantine Officer
8. PLANT DISEASE RESEARCH LABORATORY, ARS-NER P.O. Box 1209 Frederick, MD 21701 Telephone: 301-663-7344 FTS: 935-7344 935-2333	Exotic plant pathogens for weed control.	W. M. Dowler, Research Leader W. L. Bruckart, Quarantine Officer
9. BENEFICIAL INSECTS RESEARCH RESEARCH LABORATORY, ARS-NER 501 South Chapel Street Newark, Delaware 19713 Telephone: 301-731-7330 FTS: 487-6095	Exotic arthropod parasites and predators of arthropod pests. <u>Also:</u> Limited quarantine clearance and further shipment of exotic weed-feeding arthropods, phyto- and entomophagous nematodes, pollinators, dung beetles, and entomopathogens (generally to other pertinent quarantine facilities).	R. J. Dysart, Research Leader L. R. Ertle, Quarantine Officer

LaboratoryMission - Types of OrganismsResponsible Persons

10. INSECT PATHOLOGY RESEARCH
UNIT, ARS-USDA
c/o Boyce Thompson
Institute
Cornell University
Tower Road
Ithaca, New York 14853
Telephone: 607-257-2030
FTS: 420-4324

Acts as a repository and
diagnostic center for fungal
pathogens of insects.
Research centered on
development of Entomophorales
as mycoinsecticides.
Current projects include
grasshoppers, locusts,
spruce budworm, and aphids.

R. S. Soper,
Research Leader
R. A. Humber,
Mycologist

B. State Facilities

<u>Laboratory</u>	<u>Mission - Types of Organisms</u>	<u>Responsible Persons</u>
1. QUARANTINE LABORATORY Hawaii Department of Agriculture 1428 South King Street Honolulu, Hawaii 96814 Telephone: 808-548-7172	Exotic parasites and predators of arthropod and snail pests, and exotic weed-feeding arthropods.	P.-Y. Lai, Chief, Plant Pest Control Branch G. Y. Funasaki, Quarantine Officer
2. QUARANTINE LABORATORY Division of Biological Control Department of Entomology University of California Riverside, California 92521 Telephone: 714-787-5703	Arthropod parasites and predators of arthropod and snail pests, exotic terres- trial weed-feeding arthropods, and aquatic weed-feeding arthropods and vertebrates fish). <u>Also</u> : Limited receipt and diagnosis of exotic entomopathogen materials.	J. A. McMurtry, Head, Div. of Biological Control T. W. Fisher, Quarantine Supervis. M. E. Badgley, Quarantine Officer
3. QUARANTINE LABORATORY Division of Biological Control Department of Entomology University of California - Berkeley 1050 San Pablo Avenue Albany, California 94706 Telephone: 415-642-7191	Exotic arthropod parasites and predators of arthropod pests. <u>Also</u> : Limited receipt and diagnosis of exotic entomopathogen materials.	D. L. Dahlsten, Chairman, Div. of Biological Control K. S. Hagen, Professor Chairman, Insectary and Quarantine Activities Committee L. E. Caltagirone, Professor, Quarantine Officer
4. QUARANTINE LABORATORY Department of Entomology University of California Davis, California 95616 Telephone: 916-752-6935 -0484 -0475	Exotic arthropod parasites and predators of arthropod pests.	R. K. Washino, Chairman, Dept. of Entomology L. E. Ehler, Associate Professor, Quarantine Officer
5. DEPARTMENT OF PLANT PATHOLOGY University of Florida Gainesville, Florida 32611 Telephone: 904-392-7240	Exotic plant pathogens for control of weeds.	C. L. Niblett, Chairman, Dept. of Plant Pathology R. Charudattan, Professor, Quarantine Officer

<u>Laboratory</u>	<u>Mission - Types of Organisms</u>	<u>Responsible Persons</u>
<p>6. BIOLOGICAL CONTROL LABORATORY Division of Plant Industry Florida Department of Agriculture and Consumer Services P.O. Box 1269 Gainesville, Florida 32602 Telephone: 904-372-3505</p>	<p>Exotic arthropod parasites and predators of arthropod pests, and exotic arthropods for control of terrestrial and aquatic weeds, including host specificity testing.</p>	<p>H. A. Denmark, Chief Bur. of Entomology, DPI R. I. Sailer, Prof. Dept. of Entomol. & Nematology, Univ. of Florida G. R. Buckingham, ARS, USDA (See A.7) A. B. Hamon, In-Charge Quarantine Security Bur. of Entomol. C. A. Bennett, Quarantine Officer</p>
<p>7. BENEFICIAL INSECTS QUARANTINE LABORATORY Department of Entomology Virginia Polytechnic Institute and State University Blacksburg, Virginia 24061 Telephone: 703-961-5832</p>	<p>Exotic arthropod parasites and predators of arthropod pests and host specificity study of exotic weed-feeding arthropods.</p>	<p>S. L. Poe, Head, Dept. of Entomology L. T. Kok, Professor, Quarantine Officer</p>
<p>8. INVERTEBRATE PATHOLOGY LABORATORY Department of Entomology Ohio State University 1735 Neil Avenue Columbus, Ohio 43210 Telephone: 614-422-8209 -1085 (Quarantine operations are currently inactive at this facility, but could be reactivated as necessary; notification of need is required well in advance.)</p>	<p>Quarantine study of biological control agents (particularly microbiological agents) of invertebrates affecting man and animals, including biological control agents for invertebrate vectors of human diseases.</p>	<p>D. L. Goleman, Chairman Dept. of Entomology J. D. Briggs, Professor, Quarantine Officer</p>
<p>9. QUARANTINE LABORATORY Department of Entomology Texas A&M University and Texas Agricultural Experiment Station College Station, Texas 77843 Telephone: 713-845-2516</p>	<p>Exotic arthropod parasites and predators of arthropod pest.</p>	<p>F. G. Maxwell, Head, Dept. of Entomology M. J. Rose, Quarantine Officer</p>

VI. INFORMATION ON IDENTIFICATION SERVICES OF THE INSECT IDENTIFICATION
AND BENEFICIAL INSECT INTRODUCTION INSTITUTE (IIBIII), ARS, USDA.

In addition to the information contained on the following pages, an IIBIII Program Information document can be obtained by contacting Dr. Lloyd Knutson, Chairman, IIBIII, at the address noted on the following page. This document contains a list of the names, addresses, and telephone numbers of Institute staff, with a list of the specific taxonomic groups for which each taxonomist is assigned responsibility for research and identification. A supply of form NER-625 can also be obtained from Dr. Knutson.



IDENTIFICATION REQUEST – INFORMATION/INSTRUCTIONS

The Insect Identification and Beneficial Insect Introduction Institute (IBI) is the U.S. Federal agency responsible for providing identifications and other taxonomic services for insects and related organisms. We are pleased to be of assistance; however, it is appropriate that you determine if sources of identifications are available in your area or country *before submitting material*.

1. Use this form for submission of each *lot* – *not* for individual specimens. Retain Part III for your records. Send Part I in advance and Part II enclosed with your submittal to:
Dr. Lloyd Knutson, Chairman
Insect Identification and Beneficial Insect Introduction Institute
Building 003, Room 1
Beltsville Agricultural Research Center–West
Beltsville, Maryland 20705
2. Each specimen, whether pinned, in a vial, or on a slide, must be labeled as to – specific locality (country, state, or other political subdivision, and city or pertinent local landmark), date of collection, name of collector, scientific name of host (*if known*), and voucher number (*if appropriate*). Each specimen should have a unique number to facilitate reporting of identifications. See reverse side for preparation of specimens.
3. A brief description of your project will enable us to place the proper priority on your request. Early submittals, and submittals of small lots as studies progress, will ensure faster service.
4. Lots relating to agricultural interests are given highest priority. Requests for information on hosts, distribution, identification characteristics, literature references, etc. are generally answered at the option of the taxonomists based on their evaluation of the request and time available.
5. Inquiries on the status of an identification request may be made by—
Correspondence to Lloyd Knutson at the above address
Telephone — Mary Lacey (301) 344-3041 *or*
(301) 344-4451
Technical inquiries on identifications or responses made by the taxonomists should be sent directly to them.
6. Specimen(s) that represent new species, new host, or new distribution records may be retained at the discretion of the taxonomist for placement in the U.S. National Collection of Insects in the Smithsonian Institution. Approximately 50,000 specimens are added to the National Collection every year as a result of the IBI identification service. The opportunity to retain specimens of interest is one way in which our collaborators can be recompensed for their assistance.
7. Users of this service should appropriately cite the taxonomist in their publications and reports. If the identifier cannot be given after the name of the taxon (*e.g.*, in tables or lists), a footnote or other means of acknowledgment should be used. Proper formatting, as appropriate, is as follows:
Name of taxonomist, Systematic Entomology Laboratory, U.S. Department of Agriculture
Name of taxonomist, Department of Entomology, Smithsonian Institution.
Cooperating entomologists at other institutions should be listed in similar format.
8. Please send reprints of publications and other documents in which our identifications are used to Lloyd Knutson at the above address.

The insect and mite taxonomic service program of the Insect Identification and Beneficial Insect Introduction Institute (IIBIII), with the aid of entomologists in the Smithsonian Institution and other cooperators, provides identifications of about one-third million specimens per year (about 40,000 scientific names, or 13,000 consignments or lots) for an extremely wide variety of users. Unfortunately, some specimens must be returned unidentified because the poor condition of a specimen may prevent its identification, the classification of a group may need or be undergoing revision, the quantity of material may be too large for us to accept, or the request may not be in line with our priorities. We also lack specialists or cooperators for some groups (*see list below*).

Immature stages are accepted for identification, but the classification of immature forms is so poorly known in many groups that even identification to family is not possible. For this reason we urge all collectors to *rear some of the specimens* and *submit adults with the associated immature stages*.

Preparation of Specimens Submitted for Identification . . . Because of a lack of sufficient technical assistance to prepare specimens for identification, we are including the following instructions to help you prepare specimens in a condition suitable for study.

PINNED — Most specimens should be pinned; those too small or fragile for direct pinning should be double mounted on minuten nadeln or carefully glued to paper points. Glue the point to the right side of the specimen, using care that the glue does not conceal critical characters. Do not glue tiny *moths* or *flies* to points; use minuten nadeln. Specimens should be pinned while fresh. *Moths* should be submitted with wings spread. Examination of properly prepared genitalia is necessary to identify many insects to genus or species level. Specific instructions for preparing genitalia will be supplied upon request. Puparia, pupal skins, cocoons, etc. should be placed in a gelatin capsule or glued to a card pinned below the adult.

SLIDE MOUNTS — Submit *mites*, *fleas*, *thrips*, *aphids*, *whiteflies*, most *scales*, and *mosquito* larvae on microscope slides, if you can prepare good slides. This will enable us to identify the material more quickly. Some *trichogrammatid* and *mymarid wasps* and other minute insects must also be mounted on slides. Larval *ticks* are acceptable as slide mounts if they are not engorged. Specific instructions for slide-mounting the above groups will be supplied upon request.

ALCOHOL — Submit the following specimens in alcohol: *ichneumonid wasps*, all *soft-bodied insects* (including all *larvae* and *pupae*), and most *insects under 2 mm* in length, except as indicated below. Also, specimens in the groups listed under *Slide Mounts* should be preserved in 70% alcohol if not slide-mounted. Adult *whiteflies* may be submitted in alcohol, but identification of this stage usually is not possible. Never submit adult *moths*, *bees*, *true bugs*, *mosquitos*, or *psychodid*, *dolichopodid*, *phorid*, *lonchopterid*, *bibionid*, and *scenopinid flies* in alcohol. **Place Only One Kind of Insect in Each Vial.** Use neoprene-, rubber-, or silicone-stoppered vials rather than screw-capped or shell vials. Use clear glass vials of sufficient size to allow the use of forceps or an eye dropper to remove the specimens; however, if the vial is too large, very small specimens will be difficult to find. Do not use methanol or formalin solutions; use 70, 80, or 95% ethanol if possible. Isopropanol, the drugstore variety, is adequate only for temporary storage. To prevent dilution of the alcohol and subsequent decomposition of specimens, fresh alcohol must be placed in the vials within 24 hours after *initial immersion* of specimens.

PREPARATION of SPECIFIC FORMS — Kill *larvae* by placing them in boiling water or in an alcohol-glacial acetic acid mixture, then transfer them to 70% alcohol. *Ichneumonid wasps* and *mayflies* should be killed and preserved in 95% ethanol; *thrips* should be killed and preserved in AGA (9 parts 70% alcohol: 1 part glycerine: 1 part glacial acetic acid). Nymphal, adult, and engorged larval *ticks* should be preserved in 70–80% ethanol.

DRY, UNMOUNTED — If *whiteflies* and *diaspidid scales* are not mounted on slides, they should be submitted on host plants placed between pieces of dry paper towel, blotters, or other absorbent paper. Do not place specimens belonging to these families in plastic bags.

PILLBOXES — Pillboxes and matchboxes are **NOT** acceptable containers for submitting insects, but they may be used to submit associated plant samples, galls, or similar material. Soft tissue paper or cellucotton, *not cotton*, should be used in such boxes.

Identification Capability Adults and immatures of all groups of insects and related arthropods are accepted for identification by IIBIII taxonomists, except those listed below. Groups marked by an asterisk are accepted but referred to cooperators outside the Institute. Identification of these is at the *discretion of the cooperator*. Groups *not marked* by an asterisk are usually returned unidentified. With appropriate justification, we may attempt to identify some of these groups or may provide names and addresses of other experts.

* Anoplura	* Ephemeroptera	* Neuroptera	Protura	Thysanura
* Collembola	* Mallophaga	* Odonata	* Psocoptera	* Trichoptera
Diplura	* Mecoptera	* Plecoptera	* Siphonaptera	

INSECT GROUPS

COLEOPTERA	Coleoptera — Cont.	Diptera — Cont.	LEPIDOPTERA (adults)	Lepidoptera (adults) Cont.
* Amphizoidae	* Psephenidae	* Drosophilidae	Copromorphoidea	* Tineioidea
* Buprestidae	* Staphylinidae	Empididae	Cossoidea	Tortricoidea
* Carabidae		* Ephydriidae	* Eriocranioidea	Yponomeutoidea
* Cleridae	DIPTERA	* Heleomyzidae	* Hepialoidea	Zygaenoidea
* Dryopidae	Acroceridae	* Lauxaniidae	Hesperioidea	
* Dytiscidae	Apioceridae	Mydidae	* Incurvarioidea	HYMENOPTERA
* Elmidae	Asilidae	Nemestrinidae	* Micropterygoidea	Ichneumonidae
* Georyssidae	* Blephariceridae	* Ptychopteridae	* Nepticuloidea	Apoidea
* Gyrinidae	Bombyliidae	Scenopinidae	* Papilionoidea 1/	
* Haliplidae	* Camillidae	* Tanyderidae	* Sesiidae	HEMIPTERA
* Hydrophilidae	* Celyphidae	* Tipulidae	Sphingidae	* Tingidoidea
* Limnebiidae	* Coelopidae	* Trichoceridae 1/		
* Limnichidae	* Culicidae	* Trixoscelididae		
* Nitidulidae	* Curtonotidae			
* Oedemeridae	* Diastatidae			
* Paussidae	* Dryomyzidae			

1/ True butterflies (Papilionoidea) — from outside North America only — will be identified if — 1. voucher specimens may be retained, 2. the specimens have been reared or parasitized, and 3. all specimens are fully labeled, including food plant data.

NON-INSECT GROUPS

* Araneida (spiders)	Diplopoda (millipedes)	Pedipalpida (shipscorpions)
* Argasidae (softbacked ticks)	Hydrachnellae (water mites)	* Phalangida (daddy longlegs)
Chelonethida (pseudoscorpions)	* Ixodidae (hardbacked ticks)	Scorpionida (scorpions)
Chilopoidea (centipedes)	Gastropoda (snails * slugs)	Solpugida (solpugids)
Crustacea (includes sowbugs & pillbugs)	Oligochaeta (earthworms)	Symphyla (symphylans)

IDENTIFICATION REQUEST

LOT NO.

PRIORITY

DATE

Sender's Reference No.

DATE IDENTIFICATION REQUIRED (month, day, year)
If less than one month,
explain below.

TOTAL NUMBER SENT

Pinned:

Vials:

Slides:

Other:

NOTE: • Please type or print all information.

• Do not write in shaded areas.

• Give explanations where requested in "Remarks" section at bottom of form.

• Attach additional pages if more space is needed.

NAME & COMPLETE MAILING ADDRESS OF SENDER (Include Zip code)

RETURN TO (If other than sender) (Include Zip code)

SOURCE

- SU ☐ State University
OS ☐ Other State
PU ☐ Private University
IN ☐ Individual
CO ☐ Commercial Organization
FN ☐ Non - U.S.
CI ☐ CICP

☐ ARS☐ APHIS - PPQ☐ FS☐ U.S. Military☐ Other Federal☐ State Agricultural Agency

LEVEL/TYPE OF IDENTIFICATION NEEDED

☐ Family ☐ Genus ☐ Species☐ Positive or negative verification of:Ecological group: ☐ phytophagous ☐ parasitic☐ saprophagous ☐ aphidophagous ☐ predaceous☐ other (specify)OTHER INFORMATION REQUESTED - Will be supplied as conditions allow,
determined by taxonomist.☐ Pest status☐ Geographical distribution☐ Usual hosts (prey)d ☐ Best referencee ☐ Identifying characteristicsf ☐ Other (Specify)

SOURCE OF PROJECT SUPPORT

☐ ARS ☐ APHIS ☐ FS ☐ CSRS Regional project no.:☐ Hatch ☐ EPA ☐ INTR ☐ NIH ☐ NSF ☐ FAO☐ USAID ☐ Other (Specify)

REASON FOR IDENTIFICATION (Check and complete as appropriate)

a ☐ Biological control1 ☐ Scientific name of target pest:2 ☐ General quarantine or biocontrol research2 ☐ Identity of host of natural enemy4 ☐ Recovery of released natural enemy5 ☐ Suspected contaminant in culture6 ☐ Quarantine reference collection7 ☐ Voucher specimen of field release8 ☐ Holding living material pending identificationb ☐ Damaging crop, plants - identify host plants:c ☐ Suspected pest of regulatory concernd ☐ Stored product pest - commodity affected:e ☐ Livestock, domestic animal pest - host:f ☐ Danger to human healthg ☐ Household pest - damage:h ☐ Possible immigrant - new to:i ☐ Reference collectionj ☐ Survey - explain in detail belowk ☐ Thesis problem - describe project below ☐ M.S. ☐ Ph.D.l ☐ Other - explain below

SPECIMEN DISPOSITION

☐ Return ☐ Place in National Collection☐ Keep part of series ☐ Other (Specify)

VOUCHER SPECIMEN(S) INCLUDED

How marked?

Will be deposited in:

TELEPHONE REPORT REQUESTED
If yes, give number - include area code
and extension

DESCRIPTION OF PROJECT - Include Project Title and name of Project Leader. (Reference previous communications.)

REMARKS (Explanations, tentative identification, collection data, etc.)

For IIBIII Use
DATE RECEIVEDNo.
Label
Sorted
Prepared

DATE ACCEPTED

RR



July 25, 1983

(Original: October 14, 1980)

(Last revised: April 14, 1982)

INSECT IDENTIFICATION AND BENEFICIAL INSECT INTRODUCTION INSTITUTE

POLICY REGARDING IDENTIFICATION OF PARASITIC WASPS

One of the key, long-term responsibilities of the Insect Identification and Beneficial Insect Introduction Institute (IIBIII) is to provide various kinds of support for biological control research and action programs; that is, research, identifications, training, and diverse biosystematic information. Identification of parasitic wasps is one of the most important of these responsibilities.

Increasing emphasis on biological control, necessitating more prompt and accurate identification, and expanded research on parasitic wasps requires that we frequently review and adjust our policy regarding identifications of this group to fit changing needs and capabilities.

SPECIMENS CAN BE ACCEPTED ROUTINELY FOR IDENTIFICATION BY IIBIII ONLY IF THEY MEET THE FOLLOWING REQUIREMENTS:

1) The specimens are prepared in a condition suitable for study. Please see guidelines for proper preparation on pp. 5-9. The condition of the specimens usually directly affects the level to which they can be identified and the time required for identification.

2) The specimens are reared from known hosts. The host should be identified, at least to genus, before the parasites are submitted for identification. If the host is submitted to this Institute for identification, be sure to indicate that your associated parasites are being held pending identification of the host.

NOTE: We recognize that in some research projects, especially during the early stages, it is difficult to associate a parasite with its insect host. Therefore, for families other than those in the Chalcidoidea and Proctotrupeoidea obtained from such rearings, identifications by IIBIII taxonomists will be made to subfamily or genus and the host range will be indicated, if possible. Then, after further study of the insect-host relationship, identification to species will be made for those that are found to be of importance to the study. Because the Chalcidoidea and Proctotrupeoidea are generally not as well known as the others, their insect host must be known before identifications will be provided. Swept material generally cannot be accepted. BUT NOTE: We will accept such specimens collected -- not necessarily reared -- to verify the "establishment" of imported and released natural enemies.

IIBIII Policy Regarding Identifications of Parasitic Wasps

3) The specimens are from the U.S.A. or, if foreign, are pertinent to research or biological control projects being conducted in the U.S.A. or by U.S. scientists, or prior arrangements for identification have been made. Other parasitic wasps should not be sent unless the sender in each instance makes prior arrangements with the individual IIBIII taxonomist involved. In order to decide whether or not to accept non-reared, host-indefinite, or non-U.S.A.-related parasitic wasps, the IIBIII taxonomist would need to know the specific nature of the research being conducted and the supposed relationship to that research of the material being submitted. From such material, the taxonomist ordinarily will identify only those specimens whose identities are meaningful relative to the research being conducted.

TAXONOMISTS RESPONSIBLE FOR IDENTIFICATIONS OF PARASITIC WASPS IN THE INSECT IDENTIFICATION AND BENEFICIAL INSECT INTRODUCTION INSTITUTE

DR. E. ERIC GRISSELL - Systematic Entomology Laboratory, USDA, Room 446, c/o U.S. National Museum of Natural History, Washington, D.C. 20560. Telephone (202) 382-1781.
Chalcidoidea: Agaonidae, Chalcididae, Eurytomidae, Leucospidae, Ormyridae, Pteromalidae, Tetracampidae, and Torymidae.

DR. AKEY C. F. HUNG - Beneficial Insect Introduction Laboratory, USDA, Building 264, BARC-East, Beltsville, MD 20705. Telephone (301) 344-2038. Trichogrammatidae. Certain material of this family is identified by Mr. D. L. Vincent, a support scientist who works with Dr. Hung.

DR. PAUL M. MARSH - Systematic Entomology Laboratory, USDA, Room 4, Bldg. 003, BARC-West, Beltsville, MD 20705. Telephone (301) 344-3183. Braconidae, Aphidiidae, and Proctotrupeoidea. Mr. Scott Shaw assists Dr. Marsh in the identification of most genera and certain species.

DR. ARNOLD S. MENKE - Systematic Entomology Laboratory, USDA, Room 452, c/o U.S. National Museum of Natural History, Washington, D.C. 20560. Telephone (202) 382-1803.
Parasitic Cynipoidea and Chrysidoidea.

DR. MICHAEL E. SCHAUFF - Systematic Entomology Laboratory, USDA, Room 548, c/o U.S. National Museum of Natural History, Washington, D.C. 20560. Telephone (202) 382-1784.
Chalcidoidea: Aphelinidae, Encyrtidae, Eulophidae, Eupelmidae, Mymaridae, and Signiphoridae.

DR. DAVID R. SMITH - Systematic Entomology Laboratory, USDA, Room 546, c/o U.S. National Museum of Natural History, Washington, D.C. 20560. Telephone (202) 382-1783.
Evanioidea, Megalyridae, Stephanidae, and Trigonalidae.
NOTE: Dr. Smith is also responsible for SYMPHYTA and FORMICIDAE.

IIBIII Policy Regarding Identification of Parasitic Wasps

Please note: Dr. Robert W. Carlson, the former SEL specialist for Ichneumonidae, transferred to the Asian Parasite Laboratory in April, 1980. Since that time we have not been able to accept Ichneumonidae for identification. As a partial, interim solution for identification of Ichneumonidae, we have asked taxonomists outside of IIBIII if they would assist in identifications of this family. These specialists are listed below. We are providing this information only for your convenience. Please note that charges or other conditions may be required (this is because identification work is, in many cases, not a part of official duties and must be done during the identifier's discretionary time). It is essential that you communicate with the taxonomists BEFORE sending specimens for identification.

Dr. V. K. Gupta
Director
Center for Parasitic Hymenoptera
Entomology, 103
Division of Plant Industry
P.B. No. 1269
Gainesville, FL 32602

(Material is accepted on a case-by-case basis, depending on time available and nature of material. Please write or call (AC 904-372-3505) first)).

Dr. Henry K. Townes
American Entomological Institute
5950 Warren Road
Ann Arbor, MI 48105

(A fee is charged except for identification of foreign material being held in quarantine for field release in the U.S. Please telephone (AC 313-662-8476) before sending material)).

Dr. C. C. Porter
Biology Department
Fordham University
Bronx, NY 10458

(Will accept material without host data)

Mr. John Luhman
Department of Entomology
Division of Biological Control
University of California
Riverside, CA 92521

(Scientific name of host (at least subfamily or family) desirable, but not required. Will identify swept material to genus if pinned and sorted. Will retain representatives from long series).

ALL SPECIMENS FOR IDENTIFICATION AND COVERING LETTERS SHOULD BE SENT TO DR. LLOYD KNUTSON, CHAIRMAN, INSECT IDENTIFICATION AND BENEFICIAL INSECT INTRODUCTION INSTITUTE, Rm. 1, Bldg. 003, BELTSVILLE AGRICULTURAL RESEARCH CENTER-WEST, USDA, BELTSVILLE, MARYLAND 20705. Anyone wishing to submit a large quantity of material at any one time or over an extended period of time should write in advance, stating the purpose for which the identifications are needed, what groups are involved, the taxonomic level of identification required, and any other relevant information.

IIBIII Policy Regarding Identifications of Parasitic Wasps

Handling the records and making the reports in the Institute Office reduces the correspondence load of Systematic Entomology Laboratory entomologists and our cooperators, provides uniform operation of our identification service, ensures proper tracking and reporting of material accepted for identification, and in most cases, saves time for us and you.

A handwritten signature in dark ink, appearing to read "Lloyd Knutson", with a stylized, flowing script.

LLOYD KNUTSON, Chairman
Insect Identification and Beneficial
Insect Introduction Institute

IIBIII Policy Regarding Identifications of Parasitic Wasps

NOTES ON PREPARATION OF SPECIMENS

The following notes pertain to material to be submitted to IIBIII, and are not necessarily the methods preferred by the taxonomists listed on pages 2 and 3.

1. General

Identification of many parasitic Hymenoptera to the species level requires dry specimens, since it is usually difficult to study surface sculpturing while specimens are in alcohol. If it is indicated below that a certain group should be submitted as dry specimens, please follow the specific directions.

Place different species or "look-alikes" in separate vials.

2. Labels

For pinned specimens, use small labels but include all pertinent data; i.e., precise locality, scientific name of insect and plant host (if known), date of collection and/or emergence, name of collector, and voucher label (number), if appropriate. If necessary, use more than one label. Number each specimen. Slides and vials also must be labeled and numbered. If possible, use only one label in each vial, small enough to allow preliminary examination of the specimens without removing them from the vial, yet large enough to give complete collection data. Note: the ink from ballpoint pens dissolves if placed in alcohol before the ink is completely dried. It is helpful if, after drying, one uses a waterproofing spray on the labels.

3. Aphidiidae

Aphidiids should be dry mounted with glue on paper points, in the same manner as described below for Braconidae. Remains of the mummified host aphid should be included, and may be glued to the base of the same point near the pin. Do not mount Aphidiidae on slides.

4. Braconidae, Evanioidea, Stephanidae, Megalyridae, Trigonalidae

Braconidae may be collected and preserved in 95% ethyl or isopropyl alcohol; however, we prefer that they be dry mounted on pins or points. Identification of most specimens to the species level requires dry specimens, since it is usually difficult to study surface sculpturing while specimens are in alcohol. Specimens over 10 mm body length should be pinned with No. 2 pins only. Specimens under 10 mm should be glued to paper points. Mount specimens on their left side with legs facing the pin and wings facing away from the pin. Use sufficient adhesive to hold the specimen on the point, but avoid excessive glue which may obscure important taxonomic characters. Do not mount any on slides.

IIBIII Policy Regarding Identification of Parasitic Wasps

5. Chalcidoidea

When a long series of specimens has been reared, it is advantageous to prepare them in several ways. For large specimens (over 2 mm in length) point mount a few dozen and place the rest in alcohol (parts 1 and 2a, below). For small specimens (under 2 mm in length) place freshly killed specimens in alcohol (part 2a) and allow some to dry a few days after death (part 2b).

See special requirements for Trichogrammatidae, no. 7, pp. 7, 8, and 9.

- A. Specimens over 2 mm length should be mounted on card points using No. 2 or 3 pins. Do not use minuten nadeln. Orient the specimen so that the point is attached to the right side of the insect, between the middle and front coxae, keeping clear of the midline. Use sufficient adhesive to hold the specimen on the point, but avoid excessive glue which may obscure important taxonomic characters.
- B. If specimens cannot be mounted on points:
 - (a) Fresh specimens (any size) should be placed in 70-80% alcohol (ethyl or isopropyl). Do not use formalin or glycerine. The insects may be placed in alive or knocked out with cyanide, CO₂, ethyl acetate, freezing, etc., before placing in alcohol. Sort the material so that, as nearly as possible, different species are in separate vials; number and label each vial. Use a clear, glass, preferably straight-sided vial with a tight-fitting top. Do not use serum vials because the stopper gets pushed too far into the tube and becomes nearly impossible to remove. To prevent the specimens from sloshing about, fill the vial to the top with alcohol. Do not use a cotton plug as the legs and antennae of the insects tend to become entangled in the cotton fibers.
 - (b) Dried, shriveled specimens should not be placed in alcohol. Place in gelatin capsules with a few wisps of cotton to prevent damage. Do not pack cotton in the capsule as a very small amount is sufficient. Place a pin through the capsule and treat as a pinned specimen for data.

6. Proctotrupoidea

The larger proctotrupoids should be pinned or mounted with glue on paper points. The smaller proctotrupoids may be submitted in alcohol, although point mounted material is preferable if this can be done without obscuring the specimen in glue. Specimens too small to dry mount should be preserved in 75% ethanol. Do not mount Proctotrupoidea on slides.

IIBIII Policy Regarding Identification of Parasitic Wasps

7. Trichogrammatidae

Specimens of Trichogrammatidae intended for identification and/or incorporation into the Beneficial Insect Introduction Institute Laboratory (BIIL) Trichogramma Voucher Collection may be submitted 1) in liquid preservative, 2) as properly prepared microslides, or 3) as living material in parasitized host eggs (by prior arrangement). For identification of most trichogrammatids, specimens of either sex are acceptable. However, for Trichogramma, males are usually required since females of most species lack adequate taxonomic characters for identification at the species level. NOTE: Dried and collapsed specimens, whether on points or detached, cannot be accepted.

1. MATERIAL SUBMITTED IN LIQUID PRESERVATIVE: Killing and preserving the specimens in small vials (2 drams or less) of 70-75% ethanol is preferred. If the use of some other preservative or fixative is necessary due to some specific preparation requirements for future use of the specimens, the specific preservative or fixative should be listed on a permanent label provided with the specimens. Each vial of specimens submitted must be accompanied by a permanent specimen label(s) of suitable size for insertion into a 2 dram vial. The label(s) should be written or printed in some form of permanent ink, should be clearly legible, and should contain the following information: 1) country (if foreign, 2) state, 3) county, township, or parish, 4) date of original field collection, 5) scientific name of host, 6) common name or scientific name of host plant, and 7) name of collector. When two or more vials are submitted in the same request, it is helpful if the person submitting the material has assigned a sample number to each vial for easy reference.
2. MATERIAL SUBMITTED ON PREPARED MICROSLIDES: Accurate identification of Trichogrammatidae ultimately requires that specimens be properly prepared on permanent microslides. In addition, for Trichogramma microslides, the male genitalia must be dissected from the specimen in order to obtain an unobstructed dorso-ventral view. Therefore, specimens submitted in alcohol or other liquid preservative require further preparation after they are received at IIBIII. Proper slide preparation involves delicate, time-consuming work. For this reason, if any single request involves more than 10 separate vial samples to be identified, or if several identification requests are anticipated for the same project over an extended period of time, we ask that the samples be submitted on properly prepared, permanent microslides (see instructions below for slide preparation of Trichogramma specimens).

IIBIII Policy Regarding Identifications of Parasitic Wasps

INSTRUCTIONS FOR SLIDE-MOUNTING TRICHOGRAMMA

NOTE: Specimens of Trichogrammatidae other than Trichogramma can be mounted using this method. For such non-Trichogramma, either sex is acceptable for identification and it is not necessary to dissect the male genitalia.

Cleaning and Conditioning the Specimen(s):

- 1) Place specimens in warm clearing solution of 15-20% KOH for 20-30 minutes or in room temperature KOH solution for 60-90 minutes (specimens will probably float; that's OK). The color of the eyes should diffuse into the head (head will become orange-tinted) and the specimens may expand slightly.
- 2) Remove specimens from KOH and place in H₂O for approximately 30 minutes (specimens will float; that's OK). Each specimen should slowly expand, sort of like a balloon; beads of liquid will probably appear on the wings and body.
- 3) Remove specimens from H₂O and place into successive 2-minute baths of 50%, 70%, and 95% ethanol, 50/50% ethanol/clove oil, 100% clove oil, and 33/67% balsam/clove oil (specimens should not be left standing in the 3rd, 4th, or 5th baths for more than 2 minutes each because this will make them brittle). NOTE: Pure balsam, straight from the bottle, is much too viscous to be used in mounting Trichogramma. For this procedure, the term "balsam" refers to a previously prepared approximate mixture of either 50% pure balsam/50% xylene, or 50% pure balsam/50% clove oil.

Dissecting and Mounting the Specimen(s):

- 4) Place a small drop of 50/50% balsam/clove oil in center of slide.
- 5) For males ---
Place 1 specimen in drop; use minuten dissection needles to tease the genital capsule loose. The body of the specimen should be located just above center in the drop, and the antennae should be free from obstructions so that they can be easily seen. Place 2 Kimwipe shims at the top edge of the drop, 1 on each side of the specimen. The shims are very small (about the width of the specimen's head) pieces of tissue paper which are used to support the cover slip. Position the genital capsule approximately 2/3 of the distance between the specimen and the bottom edge of the drop.

IIBIII Policy Regarding Identifications of Parasitic Wasps

For females ---

Place 1-3 specimens in drop and, if possible, orientate each one dorso-ventrally. Place 3 Kimwipe shims at equidistant spots at periphery of drop.

Cover slips ---

- 6) Circular cover slips of 12 mm or 1/2 inch diameter are preferred for this preparation procedure.
- 7) After specimen(s) is/are properly positioned, rest the edge of a cover slip onto the microslide near the edge of the drop which is closest to the genital capsule. Being careful to avoid touching the drop too soon, lean the cover slip to about a 45° angle and release the cover slip directly onto drop. The release of the cover slip should be instantaneous. The drop should be large enough so that it spreads out under most of the cover slip rather quickly. If drop was not large enough to fill the entire cover slip, add some mounting medium (50/50% balsam/clove oil) at the edge of the cover slip and this will be drawn under the cover slip by surface tension.
- 8) Orientate the genital capsule to a dorso-ventral position by "nudging" the cover slip (with a small probe) in an appropriate direction. The appropriate direction is usually perpendicular to the longitudinal axis of the genital capsule.

Drying the slide(s):

- 9) Warm slides at 40° C for 4-7 days (7 is better). Add balsam at edge of cover slip to replace any volume lost by evaporation.
3. SUBMITTING LIVE MATERIAL: Under certain circumstances, meaningful identification of some species of Trichogramma may require the experimental manipulation of living cultures. Also, live specimens may be required for isozyme analyses, or other procedures. If this is deemed necessary by the person submitting the material or by the IIBIII taxonomist, arrangements should be made prior to the actual shipment of material. Prior arrangements are necessary because the appropriate method of shipment depends strongly on the origin of the material and the conditions of the project. NOTE: Shipment of parasitized host material may require a PPQ and/or state permit to move live plant pest species across state lines. Please write to Dr. A.C.F. Hung, Beneficial Insect Introduction Laboratory, Bldg. 264, Beltsville Agricultural Research Center - East, USDA, Beltsville, MD 20705, or phone (301) 344-2038 (FIS: 8/344-2038), prior to shipment.

VII. BIOLOGICAL SHIPMENT RECORDS: FOREIGN/OVERSEAS SOURCE,
QUARANTINE FACILITY, AND NON-QUARANTINE

The following forms and instructions have now been approved and printed, and are being distributed. Each form is a snap-set of four copies with an instruction/supplemental form cover sheet. The AD-941 and AD-942 forms represent revisions of SEA (or ARS) forms 441 and 442 which should no longer be used. The AD-943 is a new form. Instructions on the use of these forms are included in the instruction sheets for each form. Copies of these forms may be obtained from Central Supply, USDA, O&F, 3702 Ironwood Place, Landover, Maryland 20785, or from the Documentation Center.

BIOLOGICAL SHIPMENT RECORD — FOREIGN/OVERSEAS SOURCE

Form AD-941

This form is for use in recording details concerning living material for biological control and pollination studies, and other beneficial uses (biological control agents, parasitized or diseased hosts, pollinators, competitors, antagonists, and other material required for biological control studies) that are shipped —

TO: 1. **U.S. Locations**, whether in or outside the 48 contiguous states, that are approved to serve as Quarantine Facilities for receiving live exotic biological control and other organisms

- FROM:** • All foreign locations, including Canada and Mexico, and U.S. overseas laboratories
 • U.S. locations outside the contiguous 48 states (Alaska, Hawaii, U.S. territories)
 • Non-quarantine or quarantine locations in the 48 contiguous states for studies *in quarantine* in the U.S. or for shipment to Alaska, Hawaii, or U.S. territories.

2. **All Foreign Locations** including Canada and Mexico

- FROM:** • All U.S. locations, whether in or outside the 48 contiguous states
 • U.S. overseas laboratories.

Information from this form will be computerized and published by the U.S. Department of Agriculture, Agricultural Research Service, Insect Identification and Beneficial Insect Introduction Institute, Beneficial Insect Introduction Laboratory (Biological Control Documentation Center), Beltsville, Maryland 20705. Full credit will be given to individuals and organizations responsible for collection, shipment, culture, and release of the organisms included in these records. Completion of the form is voluntary.

INSTRUCTIONS

- Use a separate AD-941 set for *each* beneficial species shipped, or for undetermined parasitized material from *no more than one* host/pest species shipped.
- Type or print firmly with a ball point pen to record on all copies.
- Shipper is to complete Section I and check the appropriate box in the title block (instructions below and on reverse of cover sheet). Receiver complete Sections II and III (instructions on reverse of form).
- Record additional information in "Remarks" blocks in applicable sections of the form and on Form AD-941A, "Supplemental Data," on reverse of this cover sheet.
- Fill out all blocks as completely as possible. Use "N/A" for those not applicable, "UNK" for unknown, "941A" when supplemental data form is used. Shaded blocks are for Documentation Center and Quarantine Facility use only.
- Codes for invertebrate stages, plant parts, and microbial organisms listed on reverse of form may be used.
- See reverse of form for Routing and Copy Distribution information.

SECTION I — MATERIAL SHIPPED

Block Number

1. **From, facility or explorer** — Name and address of shipping facility. If foreign explorer, give name and institutional affiliation, and point of shipment if applicable.
2. **Organism shipped** —
 - A. **Genus, species, subspecies, author** — • Give full scientific name of *beneficial species* being shipped — also when shipping parasitized/diseased host material. If species name is unknown, use genus name and "sp." (or "n. sp." "sp. A", etc.) pending final determination or description. • If beneficial organisms are unidentified, use "parasites (disease, etc.) of [host/prey]". Use *one form for each host/prey species*. • If only non-beneficial material is shipped, enter scientific name.
 - B. **Order: Family** — If unknown, so state or list probable families of the expected *beneficial species* or of *non-beneficial species* if no beneficial species are included. Add higher taxon name for non-arthropods.
 - C. **Determined by** — Names of persons providing identification of material listed in blocks 2A and 5. Two determiners of material may be involved; if identification is based on comparison with specimens previously identified by a taxonomist, list taxonomist's name in parentheses following determiner of material actually being shipped. Add affiliation of identifiers; use acronyms. (E.g., J.J. Drea, EPL (P.M. Marsh, SEL)).
3. **Shippers File No.** — *Facilities* — Use acronyms, followed by year and consecutive number of shipment within that year (e.g., EPL-81-2). *Explorers* — Use institutional affiliation acronym, full initials of explorer in parentheses, year, and consecutive number of shipment for *that shipper within year* (e.g., UFL (RIS)-81-1).
4. **Type of organism** — *Parasites, predators, and weed feeders* include nematodes. *Other* includes competitors (e.g., dung beetles), host material (check also block 8) and other non-beneficial material for experimental use; may also be used for plants used for biological control. *Microbials* include disease suspects (animal or plant) — see codes on reverse of form — and culture/isolates of microbial (fungal, bacterial, viral, rickettsial, protozoan) pathogens, antagonists, competitors, etc. Explain "Microbial" and "Other" in block 18.
5. **Numbers and stages shipped** — If appropriate term is not listed in **Codes** on reverse side of form, spell out stage. Give total. If estimated check **Est** box. If parasitized hosts are shipped, give estimated percent parasitized, if possible.
6. **Dates transformed to stages shipped** — Inclusive dates of egg deposition, larval or adult eclosion, or pupation to stages shipped, or of parasitization or infection. If unknown, so state. These dates may differ from dates of field collection, block 9.

Block Number

9. **Dates originally field collected** — May refer to collection of parasitized host material and thus may differ from **Dates transformed to stages shipped** (block 6). "Shipped directly" means shipped in stage collected. "Emerg'd in lab" means that the stage shipped emerged from hosts or other stages originally collected.
10. **Location** — Give as precise collection data, including map coordinates (UTM, MGC, or latitude and longitude), as may be possible. If more than 2 collection sites, use block 18 and/or AD-941 A. If **lab cultured**, record name and address of facility, and date the culture was started. If known, give original collection data of the cultured material (*e.g.*, Lab culture, CIBC, Delemont, Switzerland (Origin: Austria, 1982); or Lab culture, Tex. Agr. Expt. Sta., Weslaco (Origin: Unknown, 1978)).
11. **Collectors** — If from other than shipping facility, give their affiliation (use acronym).
12. **Original host/prey** — Blocks A through C — Completion of these blocks may not be possible at the time of shipment. When appropriate, provide updated information to Receiver. Use "12A" also to record pollen or other food source of beneficial species at time of collection. For "12B", only the family name is needed for **plants**. Refer to instruction "2C" for completion of "12C".
13. **Lab cultured** — Check **Yes** only if cultured in the laboratory for *one or more complete generation(s)*. Give acronym of culture facility and details of culture in block 10.
15. **Food plant/animal of host/prey** — Use common name; if none, use genus name. If more than two food sources, record number or "multiple." Also note if food is other than plant or animal (*e.g.*, dung, decayed material, etc.).
16. **Shipped to** — Full name and address of receiving U.S. or foreign/overseas facility. Include agency designation (*e.g.*, USDA-ARS, DOA-CE, etc.).
18. **Remarks** — Include remarks on intended destination and any instructions for receiver.
22. **Shipped via** — Air freight, airmail, hand-carried, etc. Give name of carrier (*individual or company*) when applicable.

OMB NO. 0518-0013 (EXP. 2/28/87)

Shipper's File Number
(From AD-941)SUPPLEMENTAL
DATA

NOTE: • Do not fold this sheet over form when writing — carbons will distort entries.
• If additional copies are needed, photocopy and staple to form.

Section I — Additional Shipper Notes
(Identify comments by block number)

• Additional Collections

• Emergence Records

• Other

(Numbers and stages collected — Dates — Site and host/prey details)

Reported by & Date

Section II & III — Additional Receiver/Quarantine Notes

Official (S)	Other	Additional Species Emerged			Number and Stage	Specimens Retained
		Genus, species, subspecies, author	Order: Family	Determined by (Name, affiliation & date)		
						Yes (✓)

Details and Comments (Identify by block number)

Reported by & Date

Biological Shipment Record – Foreign/Overseas Source

☐ To Quarantine Facilities in Contiguous U.S.

☐ To Locations Outside Contiguous U.S.

a
b
c

☐ ☐ a ☐
☐ ☐ b ☐
☐ ☐ c ☐

Section I – REPORT OF MATERIAL SHIPPED (To be completed by Shipper)

FROM (Facility or Explorer)		2. ORGANISM SHIPPED - A. Gen., sp., subsp., auth. <input checked="" type="checkbox"/> M		3. SHIPPER'S FILE NO.	
		B. Order: Family		4. TYPE OF ORGANISM - explain MI & OT in blk. 18 <input type="checkbox"/> Parasite <input type="checkbox"/> Weed feeder <input type="checkbox"/> Predator <input type="checkbox"/> Pollinator <input type="checkbox"/> Microbial <input type="checkbox"/> Other	
		C. Determined by (names & affiliations)			
NOS. & STAGES SHIPPED (see codes)		6. DATES TRANSFORMED TO STAGES SHIPPED (month, day, year)		7. MATING OBSERVED <input type="checkbox"/> Yes _____ % <input type="checkbox"/> No	
TOTAL:				8. HOST/PREY/PEST MATERIAL PRESENT <input type="checkbox"/> Beneficial with host/prey <input type="checkbox"/> Host/prey/pest only <input type="checkbox"/> None	
DATES ORIGINALLY FIELD COLLECTED (m,d,y)		10. LOCATION - Country & Province/State & nearest Town or physical feature		11. COLLECTORS	
<input type="checkbox"/> Shipped directly <input type="checkbox"/> Emerged in Lab		12. ORIGINAL HOST/PREY (or other food sources) A. Gen., sp., subsp., auth. <input checked="" type="checkbox"/> M		C. Determined by (name and affiliation)	
LAB CULTURED (F ₁ +) B. Culture Facility (use acronym) - explain in blk. 10		B. Order: Family		D. Specimens retained <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
		14. LAB HOST/PREY - Gen., sp. (if different from blk. 12)		15. FOOD PLANT/ANIMAL OF HOST/PREY A. Field (at collection) B. Lab (when cultured)	
16. SHIPPED TO		17. INTENDED TARGET HOST/PREY - Gen., sp. (if different from blk. 12)		18. REMARKS	
19. DATE SHIPPED (m,d,y)		20. REPRESENTATIVE SPECIMENS RETAINED number: <input checked="" type="checkbox"/> Yes		21. PACKING/HANDLING <input type="checkbox"/> Usual <input type="checkbox"/> Other (explain in blk. 18)	
				22. SHIPPED VIA	
				23. SCREENED OR PACKAGED BY	

Section II – REPORT OF MATERIAL RECEIVED IN QUARANTINE (Or in facility outside contiguous U.S.)

24. DATE OF RECEIPT (m,d,y)		25. DATE OPENED (m,d,y)		26. CONDITION RECEIVED		A. Container		B. Contents		27. RECEIVER'S FILE NO.	
28. RECEIPT AND EMERGENCE RECORD (use codes)											
A. Number and Stages Received (block 2)						B. No. & Stages of Individuals of each Species Emerged Enroute and in Quarantine (alive and dead)					
Beneficials		Host/Prey or Parasitized Hosts		Parasites Emerged		• Hosts/Prey		• Beneficials		• Other • Dates of Emergence • Notes	
Alive	Dead	Alive or PH Intact	Dead	or							
TOTALS											
<input checked="" type="checkbox"/> Est	<input checked="" type="checkbox"/> Est	<input checked="" type="checkbox"/> Est	<input checked="" type="checkbox"/> Est	<input checked="" type="checkbox"/> Est							
29. REMARKS										30. REPORTED OR EXAMINED BY	

Section III – FINAL RECORD OF RECEIPT, EMERGENCE, AND DETERMINATION IN QUARANTINE (Or in facility outside contiguous U.S.)

A. Genus, Species, Subspecies, Author		B. Order: Family		C. Determined by (name, affiliation, & date)		D. Number (stage - use codes)		E. Specimens Retained numbers	
31. BENEFICIAL SPECIES									
<input checked="" type="checkbox"/> M						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
<input checked="" type="checkbox"/> M						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
<input checked="" type="checkbox"/> M						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
32. OTHER SPECIES (including other beneficials)									
<input checked="" type="checkbox"/> M <input checked="" type="checkbox"/> NC						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
<input type="checkbox"/>						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
<input type="checkbox"/>						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
33. ORIGINAL HOST/PREY (final determination)									
<input type="checkbox"/>						<input checked="" type="checkbox"/> Est		<input checked="" type="checkbox"/> Yes	
34. REMARKS				35. RELEASED, SHIPPED, CONSIGNED (enter file numbers) a <input checked="" type="checkbox"/> Yes b <input checked="" type="checkbox"/> Yes c <input checked="" type="checkbox"/> Yes			36. FINAL REPORT BY A. Name B. Date (m,d,y)		

- CODES -

NOTE: Use combination of **Invertebrates** and **Plants** codes for weed feeders and other phytophages shipped in or with plant host material (*e.g.*, L in SH, A with FO).

INVERTEBRATES

A — adults
M — male
F — female
E — eggs
L — larvae (for holometabola)
N — nymphs (for heterometabola)
J — juveniles (for nematodes)
P — pupae, puparia
C — cocoons (can also be A in C, or P in C)
MU — mummies, cadavers
PH [] — parasitized host — give stage and estimated % parasitized (*e.g.*, PHA, PHL, PHE, etc., 70%)
H — host

PLANTS

PL — whole plant
SD — seeds
SH — seed heads
SP — seed pods
RS — rosette
FL — flowers
ST — stems
RT — roots
TU — tubers
FO — foliage
LV — leaf, leaves

MICROBIAL ORGANISMS — *not* including nematodes

MI — cultures or isolates of microbial pathogens, antagonists, and competitors; fungi, bacteria, viruses, rickettsia, protozoa
D [] — disease suspects for pathogen diagnosis (*e.g.*, DPL, DFO, etc. — plant and plant parts; DHA, DHE, etc. — invertebrate stages.)

- ROUTING and COPY DISTRIBUTION -

SHIPPER (*shipping facility or explorer*)

1. Retain *Shipper (Pending) Copy* (Part 4).
2. Send remaining 3 copies and original cover sheet to quarantine or other receiving facility with material shipped.
3. If AD-941A is used — photocopy for your records and/or request photocopy from receiving facility.

RECEIVER (*quarantine or other facility*)

1. When Section III is completed, or within 1 year after receipt of shipment — send *Documentation Center Copy* (Part I) and original cover sheet to — Beneficial Insect Introduction Laboratory, BARC-E, ARS, USDA, Beltsville, MD 20705.
2. Send *Shipper Copy* (Part 2) to shipping facility or explorer.
3. Retain *Receiver/Quarantine Copy* (Part 3) for your records.
4. If AD-941A is used — photocopy for your records, and for shipper if requested.

INSTRUCTIONS

SECTION II — MATERIAL RECEIVED

28. Receipt and emergence record —

- A. **Number received** — Record number of **Organism shipped** (block 2A) received alive or dead, and any live host/prey. Check **Est** for estimates. Totals should relate to those in block 5.
- B. **Number emerged** — Record numbers that "emerge" from material received (*e.g.*, L or A from the E or L/P shipped; L or A from the PHE/PHP or PL/SH shipped). Give total number of species that emerged. Use this block for running account or use AD-941A or a separate sheet (mark with shipper's file number).

SECTION III — RECEIPT, EMERGENCE, and DETERMINATION

- 31 — 33. • If more than 6 species are obtained from a single shipment, or additional comments are needed, use AD-941A.
- Use **block 32** to list other beneficials that will likely not be shipped/consigned from quarantine, and hyperparasites and other miscellaneous species that emerged or were included in the incoming shipment.
- Use **block 33** to record final determination of original host/prey; refer to instructions for block 12.
- In **column C**, give name of person providing identification of the material received with institutional affiliation (use acronym) and date (year) of determination. If identification of this material is based on comparison with specimens identified by another person (*e.g.*, a taxonomist), give that person's name, institutional affiliation (use acronym) and date (year) in parentheses following the determiner of the material received (*e.g.*, L.R. Ertle, BIRL, 1981 (P.M. Marsh, SEL, 1979)).
- In **column D**, check **Est** for estimates.
34. **Remarks** — Include remarks on intended use (*e.g.*, for culture in quarantine, intended final destination, intended host, etc.).
35. **Released, shipped, consigned** — Record file numbers *only if material from this shipment* was removed from quarantine (shipped, consigned) or field released.

BIOLOGICAL SHIPMENT RECORD – QUARANTINE FACILITY

Form AD-942

This form is for use in recording details concerning living material for biological control and pollination studies, and other beneficial uses (biological control agents, parasitized or diseased hosts, pollinators, competitors, antagonists, and other material required for biological control studies) that are –

1. Consigned from quarantine to researchers in non-quarantine areas of the U.S. quarantine facility location, or
2. Shipped from U.S. quarantine to researchers at U.S. non-quarantine locations in the 48 contiguous states.

Note: Use Form AD-941 for shipments from quarantine to quarantine, to U.S. locations outside 48 contiguous states (Hawaii, Alaska, U.S. territories), or to all foreign locations. Use Form AD-943 for non-quarantine shipments to domestic locations.

Information from this form will be computerized and published by the U.S. Department of Agriculture, Agricultural Research Service, Insect Identification and Beneficial Insect Introduction Institute, Beneficial Insect Introduction Laboratory (Biological Control Documentation Center), Beltsville, Maryland 20705. Full credit will be given to the individuals and organizations responsible for collection, shipment, culture and release of the organisms included in these records. Completion of the form is voluntary.

INSTRUCTIONS

- Use a separate AD-942 set for *each* beneficial species or *each* parasitized/diseased host/pest species shipped/consigned.
- Type or print firmly with a ball point pen to record on all copies.
- Quarantine Facility is to complete Section I (instructions below). Receiver is to complete Sections II and III (instructions below and on reverse of cover sheet).
- Record additional information in "Remarks" blocks in applicable sections of the form, and additional release information on Form AD-942A, "Supplemental Data," on reverse of this cover sheet.
- Fill out all blocks as completely as possible. Use "N/A" for those not applicable, "UNK" for unknown, "942A" when supplemental data form is used. Shaded blocks are for Documentation Center use only.
- Codes for invertebrate stages, plant parts, and microbial organisms listed on reverse of form may be used.
- See reverse of form for Routing and Copy Distribution Information.

SECTION I – MATERIAL SHIPPED/CONSIGNED

Block Number

2. Organism shipped –

- A. **Genus, species, subspecies, author** – • Give full scientific name of *beneficial species* being shipped – also when shipping parasitized/diseased host material. If species name is unknown, use genus name and "sp." (or further designations such as n.sp., sp.A, sp. nr. [], etc.) pending final determination or description. • If only non-beneficial material is shipped, enter scientific name.
- B. **Order: Family** – Give order: family of *beneficial species* or of non-beneficial species if no beneficial species are included. Add higher taxon name for non-arthropods.
- C. **Determined by** – Names of persons providing identification of material listed in blocks 2A and 5. Two determiners of material may be involved; if identification is based on comparison with specimens identified by a taxonomist, list taxonomist's name in parentheses following determiner of the material actually being shipped. Add affiliation of identifiers; use acronyms. (E.g., L.R. Ertle, BIRL (P.M. Marsh, SEL)).
4. **Type of organism** – *Parasites, predators and weed feeders* include nematodes. *Other* includes competitors (e.g., dung beetles), host material (check also in block 8) and other non-beneficial material for experimental use; may also be used for plants for biological control. *Microbials* include diseased animals and plants – see codes on reverse of form – and cultures/isolates of microbial (fungal, bacterial, viral, rickettsial, protozoan) pathogens, antagonists, competitors, etc. Explain "Microbial" and "Other" in remarks, block 20.
5. **Numbers and stages shipped** – If appropriate term is not listed in Codes on reverse side of form, spell out stage. Give total individuals of each stage and total individuals of *all* stages. If estimated, check Est block. If parasitized hosts are shipped/consigned, give estimated percent parasitized, if possible.
6. **Dates transformed to stages shipped** – • Inclusive dates of egg deposition, larval or adult eclosion, or pupation to stages shipped, or of parasitization or infection. If unknown, so state. • "Shipped directly" means shipped directly as received from foreign/overseas source; "emerged in quarantine" is self explanatory, but see also block 16.
- 9-15. **Collection data** – Information in these blocks from pertinent AD-941 forms. In block 12, list file nos. of *all* pertinent AD-941 forms (including any needed subletter designations from Section III) for *all* material included in this shipment.
- 16-17. **Culture data** – Indicate whether and where cultured. If cultured in quarantine, give number of generations at time of shipment/consignment, and complete block 17 if different from block 13.
19. **Shipped/consigned to** – Give full name and address of person to whom shipment/consignment is made; include agency designation (e.g., USDA-ARS, or -FS; DOA-CE, etc.). If this is a consignment to a researcher of the same affiliation or location as the quarantine facility, only name and affiliation acronym is needed.

SECTION II – MATERIAL RECEIVED

30. Inventory –

- A. **Number received** – Record number of the **Organism shipped** (block 2A) received dead or alive; check E for estimate. Totals should relate to those in block 5. Use block 31 to record additional species in shipment.
- B. **Number emerged** – Record numbers of larvae or adults emerging from eggs or immature stages, respectively, or from parasitized host material or from plant material shipped, check E for estimate. Use block 31 to record additional species in shipment.
31. **Other species included** – **Note:** Only the species listed in block 2A of this form should be included in this shipment/consignment from quarantine. If other species are discovered in the shipment by the receiver, the *shipping quarantine facility should be informed immediately*. Specimens may need to be killed and returned to quarantine facility. Indicate in block 31A if specimens were returned to quarantine. Refer to instructions for "2C" for completion of "31B."
34. **Intended use** – Complete Section III if block A is checked. If part of the material is released immediately and part retained for culture or study, check blocks A and B or C. If only B or C is checked, this completes this form; report releases from these cultures on Form AD-943.

SECTION III - RELEASE

If material from this shipment is released at more than 3 sites, use Form AD-942A below, to record additional releases.

40. **Target hosts/prey** — *Be as specific as possible*; i.e., give genus-species of host/prey against which this material is actually released. If more than two hosts/prey are present at the release site, or actual host/prey species present is unknown, give generic names (e.g., *Heliothis spp.*, *Lygus spp.*) or, if more appropriate, use other general term (e.g., *aphids*, *dung flies*, etc.; *Note*: Recording of family names are most important in this case). Give further details in block 43 or on Form AD-942A below.
41. **Host/prey food** — Use common name of plants or animals, or generic names of hosts/prey that lack common names. Also note if food is other than plant or animal (e.g., dung, decayed material, etc.). If more than one food source of the target host/prey is present at release site, note here and give details in block 43 or on Form AD-942A below.
42. **Released by** — Give name of actual releaser and affiliation acronym (including supervisor, if appropriate, in parentheses).
43. **Remarks** — Also use Form AD-942A below for additional comments concerning release.

OMB NO. 0518-0013 (EXP. 2/28/87)

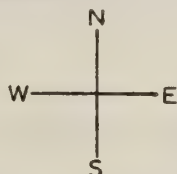
SUPPLEMENTAL
DATA

NOTE: • Do not fold this sheet over form when writing; carbons will distort entries.
• If additional copies are needed, photocopy for each site & staple to form.

Shipper's File Number
(From AD-942)

RELEASE SITE DETAILS, SITE NO. _____

• Township, route no., Farmer's name, etc. • Map of release site.



WEATHER

TEMP.

WIND

SKY

TIME OF RELEASE

CONDITION OF CROP FIELD

CONDITION OF RELEASE MATERIAL

PREDOMINANT TARGET HOST/PREY
STAGE PRESENT

TARGET HOST/PREY ABUNDANCE

ADDITIONAL HOST/PREY PRESENT

OTHER COMMENTS

Reported by & Date

ADDITIONAL RELEASES OF MATERIAL FROM SHIPMENT

(Use Form AD-943 for release of material cultured from this shipment.)

	SITE 4	SITE 5	SITE 6
Types of release	<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage <input type="checkbox"/> Other:	<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage <input type="checkbox"/> Other:	<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage <input type="checkbox"/> Other:
Locations (State, County, nearest Town or physical feature, map coordinates)			
Number and stages released (see codes)	[Est]	[Est]	[Est]
Dates of release (m.d.y)			
Target hosts/prey at release			
A. Primary - Genus, species	-----	-----	-----
B. Other - Genus, species	-----	-----	-----
C. Families			
Food (plant/animal/other) of target host/prey at release			
Released by			
REMARKS	REPORTED BY A. Name B. Date (m.d.y)		

BIOLOGICAL SHIPMENT RECORD - QUARANTINE FACILITY

(Shipment/Consignment from Quarantine)

a

b

M NC (see blk. 1)

☐ ☐ a ☐☐ ☐ b ☐

SECTION I - REPORT OF MATERIAL SHIPPED, CONSIGNED or RELEASED

FROM (Quarantine facility - name and address)		2. ORGANISM SHIPPED - A. Gen., sp., subsp., auth. <input checked="" type="checkbox"/> M		3. QUARANTINE FILE NO.	
		B. Order: Family		4. TYPE OF ORGANISM - explain MI & OT in blk. 20	
		C. Determined by (names & affiliations)		<input type="checkbox"/> Parasite <input type="checkbox"/> Weed feeder <input type="checkbox"/> Predator <input type="checkbox"/> Pollinator <input type="checkbox"/> Microbial <input type="checkbox"/> Other	
NOS. & STAGES SHIPPED (see codes)		6. DATES TRANSFORMED TO STAGES SHIPPED (month, day, year)		7. MATING OBSERVED	
[St] [St] [St]				<input type="checkbox"/> Yes _____ % <input type="checkbox"/> No	
TOTAL:		<input type="checkbox"/> Shipped directly <input type="checkbox"/> Emerged in Quarantine		8. HOST / PREY / PEST MATERIAL PRESENT	
				<input type="checkbox"/> Beneficial with host/prey <input type="checkbox"/> Host/prey/pest only <input type="checkbox"/> None	
DATES ORIGINALLY FIELD COLLECTED (m,d,y)		10. LOCATION - Country & Province/State of Origin		11. ORIGINAL COLLECTORS (names & affiliations)	
				12. FOREIGN/OVERSEAS SOURCE FILE NOS.	
LAB CULTURED (F ₁ +)		13. ORIGINAL HOST/PREY - Gen., sp. (or other food source)		14. STAGE/PART OF HOST/PREY ATTACKED	
<input type="checkbox"/> Overseas <input type="checkbox"/> No				15. ORIGINAL FOOD SOURCE OF HOST/PREY	
<input type="checkbox"/> In Quarantine (number of generations)		17. LAB HOST/PREY - Gen., sp. (if different from blk. 13)		18. INTENDED HOST/PREY - Gen., sp. (if different from blk. 13)	
SHIPPED/CONSIGNED TO		20. REMARKS			
1. DATE shipped/consigned (m,d,y)		22. REPRESENTATIVE SPECIMENS RETAINED number: <input checked="" type="checkbox"/> Yes		23. PACKING/HANDLING	
				<input type="checkbox"/> Usual <input type="checkbox"/> Other (explain in blk. 20)	
				24. SHIPPED VIA	
				25. SCREENED OR PACKAGED BY	

SECTION II - REPORT OF RECEIPT AND INTENDED USE

26. DATE OF RECEIPT (m,d,y)		27. DATE OPENED (m,d,y)		28. CONDITION RECEIVED		A. Container		B. Contents		29. REPORTED OR EXAMINED BY	
30. INVENTORY OF MATERIAL RECEIVED (use codes)						31. OTHER SPECIES INCLUDED OR EMERGED					
A. Number and stages received (blk. 2)		B. Number Emerged (stages)				A. Order: Family and Genus, species, author, if known		B. Determined by (name & affiliation)		C. No. and Stages (use codes)	
Beneficials		Host/Prey									
Alive Dead		Alive Dead		Alive Dead							
TOTALS											
[E]		[E]		[E]							
33. SPECIMENS FROM SHIPMENT RETAINED BY RECEIVER						34. INTENDED USE			35. INTENDED LAB HOST/PREY - Gen., sp.		
<input type="checkbox"/> Yes <input type="checkbox"/> No						Lab culture/study					
number						A. <input type="checkbox"/> Immediate release (complete Sec. III)			B. <input type="checkbox"/> Release intended		
						C. <input type="checkbox"/> No release intended					

SECTION III - REPORT OF RELEASE

		SITE 1		SITE 2		SITE 3	
		<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage		<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage		<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage	
		<input type="checkbox"/> Other:		<input type="checkbox"/> Other:		<input type="checkbox"/> Other:	
36. Types of release							
37. Locations (State, County, nearest Town or physical feature, map coordinates) (Use AD-942A for more details)							
38. Number and stages released. (see codes)		[Est]		[Est]		[Est]	
39. Dates of release (m,d,y)							
40. Target hosts/prey at release							
A. Primary - Genus, species							
B. Other - Genus, species							
C. Families							
41. Food (plant/animal/other) of target host/prey at release.							
42. Released by (Name & affiliation)							
43. REMARKS (use AD-942A for more details)						44. REPORTED BY	
						A. Name	
						B. Date (m,d,y)	

— CODES —

NOTE: Use combination of **Invertebrates** and **Plants** codes for weed feeders and other phytophages shipped in or with plant host material (e.g., L in SH, A with FO).

INVERTEBRATES

A — adults
M — male
F — female
E — eggs
L — larvae (for holometabola)
N — nymphs (for heterometabola)
J — juveniles (for nematodes)
P — pupae, puparia
C — cocoons (can also be A in C, or P in C)
MU — mummies, cadavers
PH[] — parasitized host — give stage and estimated % parasitized (e.g., PHA, PHL, PHE, etc., 70%)
H — host

PLANTS

PL — whole plant
SD — seeds
SH — seed heads
SP — seed pods
RS — rosette
FL — flowers
ST — stems
RT — roots
TU — tubers
FO — foliage
LV — leaf, leaves

MICROBIAL ORGANISMS — *not* including nematodes

MI — cultures or isolates of microbial pathogens, antagonists, and competitors; fungi, bacteria, viruses, rickettsia, protozoa
D[] — disease suspects for pathogen diagnosis (e.g., DPL, DFO, etc. — plant and plant parts; DHA, DHE, etc. — invertebrate stages)

— ROUTING AND COPY DISTRIBUTION —

QUARANTINE FACILITY

1. Retain *Shipper (Pending Copy) (Part 4)*
2. Send remaining 3 copies and original cover sheet with material shipped.
3. When copies of completed form are returned by receiver —
 - Send *Documentation Center Copy (Part 1)* and original cover sheet to Beneficial Insect Introduction Laboratory, BARC-East, ARS, USDA, Beltsville, Maryland 20705.
 - Retain *Quarantine Facility Copy (Part 2)* for your records; discard *Shipper (Pending) Copy*.
 - If Form AD-942A is used — photocopy for your records and for receiver, if requested.

RECEIVER

1. When form is completed (Section III is completed, or blocks 32B or C are checked) — return copies 1 and 2, and original cover sheet, to originating Quarantine Facility.
2. Retain *Receiver Copy (Part 3)* for your records.
3. If Form AD-942A is used — photocopy for your records or request photocopy from Quarantine Facility.

United States Department of Agriculture
BIOLOGICAL SHIPMENT RECORD – NON-QUARANTINE
Form AD-943

This form is for use in recording details concerning living material for biological control and pollination studies, and other beneficial uses (biological control agents, parasitized or diseased hosts, pollinators, competitors, antagonists, and other material required for biological control studies) that are –

1. Released from U.S. non-quarantine cultures or recolonized from established populations in the U.S., or

2. Shipped interstate between U.S. non-quarantine locations in the 48 contiguous states.

Note: Use Form AD-941 for shipments (1) to U.S. locations outside the 48 contiguous states (Hawaii, Alaska, U.S. territories), (2) to all foreign locations (including Canada and Mexico), and (3) to U.S. quarantine facilities for studies in quarantine.

Information from this form will be computerized and published by the U.S. Department of Agriculture, Agricultural Research Service, Insect Identification and Beneficial Insect Introduction Institute, Beneficial Insect Introduction Laboratory (Biological Control Documentation Center), Beltsville, Maryland 20705. Full credit will be given to the individuals and organizations responsible for collection, shipment, culture and release of the organisms included in these records. Completion of the form is voluntary.

INSTRUCTIONS

- Use a separate AD-943 set for *each* beneficial species or *each* parasitized/diseased pest species shipped.
- Type or print firmly with a ball point pen to record on all copies.
- Fill out all blocks as completely as possible. Use "N/A" for those not applicable, "UNK" for unknown. Shaded blocks are for Documentation Center use only.
- Use Form AD-943A, "Supplemental Data" on reverse of this cover sheet for recording additional information; note "943A" in the applicable block on the AD-943.
- Codes for invertebrate stages, plant parts, and microbial organisms on reverse of form may be used.
- See reverse of form for Routing and Copy Distribution Information.

SECTION I

To be completed by Originator of Shipment or Release

Block Number

2. Beneficial shipped – If parasitized host material is shipped or released, give name and order: family of *beneficial species* in blocks A and B. For block C, give name and institutional affiliation of last known identifier of the cultured or field-collected material being shipped or released.

3. Shipper/Releaser File No. – Use acronym of facility and shipper/releaser's full initials in parentheses, and the year and the consecutive number of shipment/release by that shipper/releaser for that year (e.g., BIIL (RFWS) - 83 - 2).

4. Type of Organism – *Parasites, predators, and weed feeders* include nematodes. *Other* includes competitors (e.g., dung beetles) and plants used for biological control. *Microbials* include cultures and isolates of microbial (fungal, bacterial, viral, rickettsial, protozoan) pathogens, antagonists, competitors, etc.

5-8. Part A: From U.S. Field Collection – Complete if organism to be shipped or released has been field collected in the U.S. for recolonization elsewhere or for culture. In block 5, give original shipment/release file numbers, if known. If maintained in culture for more than one generation before release, also complete Part B.

9-13. Part B: From Laboratory Culture – Complete if organism is being shipped or released from a laboratory culture at a non-quarantine facility. In block 9, list file numbers from block 3 of *all* quarantine (AD-942) and/or non-quarantine (AD-943) forms for shipments which provided material for the culture. If culture includes domestically collected material listed in Part A, check appropriate box. Complete blocks 10 and 11, especially if culture is from other sources.

SECTION II – SHIPMENT INFORMATION

Complete *only* in case of shipments; blocks 14-18 are to be completed by originator (shipper), blocks 19-24 (and Section III, if appropriate) by receiver. See codes for invertebrate stages, plant parts, and microbial organisms on reverse of form; if *parasitized hosts are shipped*, give *estimated % parasitized*. If count is estimated, use *Est* box. For certain commercial and other facilities with numerous shipments annually who choose *not* to use this form for each shipment, please provide Documentation Center with one form for each species shipped during the year, with Section I completed, and in lieu of Section II, a list of recipients (names, with city and state in lieu of full addresses), with numbers shipped to each, and dates of shipments, or provide other records of shipments.

SECTION III – RELEASE/RECOLONIZATION

If more than 3 releases of material reported in Section I are made *during a single year and in a single state*, use Form AD-943A on reverse of this cover sheet to record details, and data can be summarized on Form AD-943 as follows:

• **Alternative 1** – Multiple releases made at a single location/site (or within an area of 1 square mile) during the year *may* be reported under a *single* site column of a single form, *if* entries for blocks 29 and 30 (host information) remain the same for all releases. Give specific information on AD-943 (and on AD-943A, Sections A & B as appropriate) on location in block 26, *total* number and stages released at that location/site (use Code; if parasitized hosts are released, give *estimated % parasitized*) in block 27, and give *inclusive* release dates (e.g., 5/3 – 7/16/83), in block 28. Record actual release numbers and dates on Form AD-943A, Section C, on back of this cover sheet.

• **Alternative 2** – Multiple releases made at several sites within 5 miles of a location (town or suburb or physical feature locatable on a map) *may* be reported under a *single* site column of a single form, *if* entries for blocks 29 and 30 (host information) remain the same for all releases. Give location and number of sites in block 26. Give *total* number and stages released and *inclusive* dates of release in blocks 27 and 28, in the manner noted for Alternative 1 above. Record actual release sites, numbers and dates on Form AD-943A, Section C, on reverse of cover sheet; photocopy and use additional sheets as needed.

• **Alternative 3** – If material is released at numerous locations within a county or within a state during a single year and against the same target species (and host plant if applicable), blocks 26-28 *may* be used as a single block to record all releases within the county or state. Record the *total* number of individuals released, the stages released, the *inclusive* dates of release, and total number of release sites, for the county or state in which the releases were made. Record actual details of each release on Form AD-943A, Section C, on reverse of cover sheet; photocopy and use additional sheets as needed.

Block Number

29. Target hosts/prey – *Be as specific as possible here; i.e., give genus-species of host/prey against which this material is actually released.* If more than two hosts/prey are present at the release site, or actual host/prey species present is unknown, give generic names (e.g., *Heliothis spp.*, *Lygus spp.*) or if more appropriate, other general term (e.g., aphids, dung flies, etc.; Note: *Recording of family names is most important in this case*). Give further details in block 32 or on Form AD-943A on the reverse of this cover sheet.

30. Host/prey food – Use common name of plants or animals, or generic names of hosts/prey that lack common names. Also note if food is other than plant or animal (e.g., dung, decayed material, etc.). If more than one food source of target host/prey is present at release site, note here and give details in block 32 or on Form AD-943A on the reverse of this cover sheet.

31. Give name of actual releaser (and of supervisor, if appropriate, in parentheses). For multiple releases, give details on Form AD-943A on the reverse of this cover sheet, as needed.

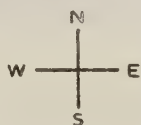
SUPPLEMENTAL DATA

NOTE: • Do not fold this sheet over form when writing—carbons will distort entries.
• If additional copies are needed, photocopy and staple to form.

Shipped 3-1-83, 10/83
(From AD 943)

Section A — RELEASE SITE DETAILS, SITE NO. _____

• Township, route no., Farmer's name, etc. • Map of release site.



WEATHER

TEMP.

WIND

SKY

TIME OF RELEASE

CONDITION OF CROP FIELD

CONDITION OF RELEASE MATERIAL

PREDOMINANT TARGET HOST/PREY
STAGE PRESENT

TARGET HOST/PREY ABUNDANCE

ADDITIONAL HOST/PREY PRESENT

OTHER COMMENTS

REPORTED BY & DATE

Section B — DETAILS OF ADDITIONAL RELEASES (Attach additional sheets as needed.)

	SITE 4	SITE 5	SITE 6
Types of release	<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage <input type="checkbox"/> Other:	<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage <input type="checkbox"/> Other:	<input type="checkbox"/> Field <input type="checkbox"/> Greenhouse <input type="checkbox"/> Cage <input type="checkbox"/> Other:
Locations (State, County, nearest Town or physical feature, map coordinates)			
Number and stages released (See codes)	[Est]	[Est]	[Est]
Dates of release (m,d,y)			
Target hosts/prey at release			
A. Primary — Genus, species	-----	-----	-----
B. Other — Genus, species	-----	-----	-----
C. Families			
Food (plant/animal/other) of target host/prey at release			
Released by			

(Alternatives 1 and 2)

Section C — DETAILS OF MULTIPLE RELEASES (Attach additional sheets as needed.)

SITE _____		SITE _____		SITE _____	
Dates of release	Nos. Released (stages)	Dates of release	Nos. Released (stages)	Dates of release	Nos. Released (stages)

(Alternative 3)

Counties	Locations	Dates of Release	No. Released (Stages)

REMARKS

REPORTED BY
A. Name
B. Date (m,d,y)

BIOLOGICAL SHIPMENT RECORD - NON-QUARANTINE

SECTION I - REPORT OF MATERIAL RELEASED OR SHIPPED

FROM (Name & address of Shipper/Releaser)		2. BENEFICIAL - A. Gen., sp., subsp., auth. <input checked="" type="checkbox"/> M		3. SHIPPER / RELEASER FILE NO. (see instructions)	
		B. Order: Family		4. TYPE OF BENEFICIAL	
		C. Determined by (Name and affiliation if known)		<input type="checkbox"/> Parasite <input type="checkbox"/> WEed feeder <input type="checkbox"/> Predator <input type="checkbox"/> Pollinator <input type="checkbox"/> Microbial <input type="checkbox"/> Other (Explain M or OT):	
Part A. From U.S. Field Collection (Collected for field to field recolonization or laboratory culture)			And/Or		
COLLECTION LOCALITY(S) - State, County, nearest Town (more than 2 collection sites, give State & County only)			Part B. From Laboratory Culture		
			9. SOURCE FILE NOS.		
			<input type="checkbox"/> AD-942, AD-943: Nos. <input type="checkbox"/> Part A <input type="checkbox"/> Other:		
			10. COUNTRIES/REGION/STATE OF ORIGIN		
DATES OF COLLECTION (m,d,y)		7. COLLECTORS (Names and affiliations)		11. ORIGINAL COLLECTORS (Names and affiliations)	
				12. NO. LAB GENERATIONS (At shipper/releaser location)	
				<input type="checkbox"/> F ₁ - F ₁₀ <input type="checkbox"/> F ₅₁ + <input type="checkbox"/> F ₁₁ - F ₅₀	
15. FIELD HOSTS/PREY AT COLLECTION		16. Stage/part attacked (see codes)		13. LABORATORY HOST / PREY	
A. Genus, species				A. Genus, species	
				16. Stage/part attacked (see codes)	

SECTION II - REPORT OF SHIPMENT

SHIPPED TO (Name & address)		15. NO. & STAGES SHIPPED (use codes on reverse)		16. DATE SHIPPED (m,d,y)	
		<input checked="" type="checkbox"/> Est			
VIA:		17. SHIPPER'S REMARKS		18. SPECIMENS RETAINED BY SHIPPER	
				<input type="checkbox"/> No <input type="checkbox"/> Yes _____ nos.	
DATE RECEIVED (m,d,y)		20. NO. & STAGES (use codes)		21. RECEIVER'S REMARKS	
		A. Rec'd. Alive <input checked="" type="checkbox"/> Est B. Emerged (Beneficials) <input checked="" type="checkbox"/> Est			
SPECIMENS RETAINED BY RECEIVER		23. INTENDED USE		24. INTENDED LAB HOST / PREY - Gen., sp.	
<input type="checkbox"/> No <input type="checkbox"/> Yes _____ nos.		Lab culture / study (complete Blk. 24) A. <input type="checkbox"/> Immediate release (complete Sect. III) B. <input type="checkbox"/> Release intended C. <input type="checkbox"/> No release intended			

SECTION III - REPORT OF RELEASE / RECOLONIZATION (See instructions on cover sheet; use Form AD-943A for more details)

	SITE 1			SITE 2			SITE 3		
Types of release	<input type="checkbox"/> Field	<input type="checkbox"/> Greenhouse	<input type="checkbox"/> Cage	<input type="checkbox"/> Field	<input type="checkbox"/> Greenhouse	<input type="checkbox"/> Cage	<input type="checkbox"/> Field	<input type="checkbox"/> Greenhouse	<input type="checkbox"/> Cage
	<input type="checkbox"/> Other:			<input type="checkbox"/> Other:			<input type="checkbox"/> Other:		
Locations (State, County, nearest Town or physical feature, map coordinates) (Use AD-943A for more details; see instructions on cover sheet)									
Number & stages released (Use codes; see instructions for recording multiple releases.)	<input checked="" type="checkbox"/> Est			<input checked="" type="checkbox"/> Est			<input checked="" type="checkbox"/> Est		
Dates of releases (m,d,y) (See instructions for recording multiple releases.)									
Target hosts/prey at release									
A. Primary - Genus, species									
B. Other - Genus, species									
C. Families									
Food (plant/animal/other) of target host/prey at release									
Released by (Name and affiliation)									
REMARKS (Use AD-943A for more details)							33. REPORTED BY		
							A. Name		
							B. Date (m,d,y)		

- CODES -

NOTE: Use combination of **Invertebrates** and **Plants** codes for weed feeders and other phytophages shipped in or with plant host material (e.g., L in SH, A with FO).

INVERTEBRATES

A— adults
M— male
F— female
E— eggs
L— larvae (for holometabola)
N— nymphs (for heterometabola)
J— juveniles (for nematodes)
P— pupae, puparia
C— cocoons (can also be A in C, or P in C)
MU— mummies, cadavers
PH [] — parasitized host — give stage and estimated % parasitized (e.g., PHA, PHL, PHE, etc., 70%)
H— host

PLANTS

PL— whole plant
SD— seeds
SH— seed heads
SP— seed pods
RS— rosette
FL — flowers
ST— stems
RT— roots
TU— tubers
FO— foliage
LV— leaf, leaves

MICROBIAL ORGANISMS — *not* including nematodes
MI— cultures or isolates of microbial pathogens, antagonists, and competitors; fungi, bacteria, viruses, rickettsia, protozoa

D [] — disease suspects for pathogen diagnosis (e.g., DPL, DFO, etc. — plant and plant parts; DHA, DHE, etc. — invertebrate stages)

- ROUTING AND COPY DISTRIBUTION -

IF NO SHIPMENT IS MADE -

1. Releaser complete Sections I (Part A and/or B) and III (*see instruction cover sheet; use Form AD-943A on the reverse of cover sheet to record more details of releases.*)
2. Retain Shipper/Releaser Copy (*Part 2*).
3. Shipper (Pending) Copy (*Part 4*) may be discarded.
4. Forward Documentation Center Copy (*Part 1*) and all copies of AD-943A Form to:
Beneficial Insect Introduction Laboratory
USDA, Agricultural Research Service
BARC - East
Beltsville, Maryland 20705
5. If Form AD-943A is used — photocopy for your records or request photocopy from Documentation Center.

IF SHIPMENT IS MADE -

SHIPPER -

1. Complete blocks 1 - 18 as appropriate.
2. Retain Shipper (Pending) Copy (*Part 4*).
3. Send remaining copies to Receiver with material.
4. When copies of completed forms are returned by receiver—
 - Retain Shipper/Releaser Copy (*Part 2*) for your records, discard Shipper (Pending) Copy (*Part 4*).
 - Forward Documentation Center Copy (*Part 1*) and all copies of AD-943A Form to:
Beneficial Insect Introduction Laboratory
USDA, Agricultural Research Service
BARC - East
Beltsville, Maryland 20705
- If Form AD-943A is used, photocopy for your records and for Receiver if requested.

RECEIVER -

1. Complete blocks 19 - 24, and if immediate release, complete Section III (*see instruction cover sheet; use Form AD-943A on reverse of cover sheet to record more details of releases.*)
2. Retain Receiver Copy (*Part 3*).
3. Return remaining 2 copies and all copies of AD-943A Form used to Shipper.
4. If Form AD-943A is used, photocopy for your records, or request copy from Shipper or Documentation Center.
5. If all or part of material received is cultured for later release, use separate AD-943 forms to record subsequent releases from these cultures.

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Appendix

Items received after "press" time.

Addendum

Change for page 35:

Dr. Gordon Gordh is now (August 1984) Quarantine Supervisor of quarantine facility at University of California, Riverside. Dr. T. W. Fisher remains as Associate Quarantine Supervisor.

Information on
The Commonwealth Institute of Biological Control*

The Commonwealth Institute of Biological Control (CIBC) is one of four Institutes and ten Bureaux which presently make up the Commonwealth Agricultural Bureaux (CAB), an international organization sponsored by Commonwealth countries to provide services for agricultural scientists and biologists worldwide. The CIBC is presently being run from the U.K. unit at Imperial College, Silwood Park, and operates from stations in India, Kenya, Pakistan, Trinidad and Switzerland. Staff may also be stationed in other countries from time to time, to meet project demands.

CIBC provides a world service on the use of biotic agents in the solution of pest problems. It undertakes studies on the biology of pests and their natural enemies, selects suitable organisms for field trials and can collect or breed them for release in the target area, and assist in field release and assessment. Research is undertaken on specific control projects on behalf of sponsors, which may be donor agencies, government organizations or commercial concerns, and CIBC can provide consultants to advise on pest and weed problems. Links established with the Glasshouse Crops Research Institute, Silwood Centre for Pest Management of Imperial College, and the Institute of Virology, together with the sister institutes, Commonwealth Mycological Institute, Commonwealth Institute of Parasitology and Commonwealth Institute of Entomology, enable CIBC to call on expertise in pathogens, pest management, taxonomy, etc. to provide a complete biological control service.

The CIBC Information Service, based at the Commonwealth Institute of Entomology, provides information on all aspects of the use of biotic agents in pest control through 'Biocontrol News and Information', parasite catalogues, reviews on biological control, literature surveys for specific projects, research papers and in response to enquiries.

At the Stations, in-service training can be arranged for scientists and technicians in relevant techniques for field research and laboratory propagation of natural enemies. By arrangement with nearby universities, the Institute will supervise studies for higher degrees carried out as part of its research programme. Advice is available to developing countries who wish to set up their own biological control services.

Initial enquiries should be made to the Assistant Director in the U.K.

* Prepared by D. J. Girling and M. J. W. Cock, CIBC, Silwood Park, U.K.

Commonwealth Institute of Biological Control Staff

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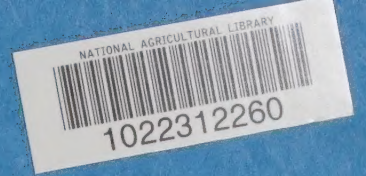
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------------------------	-----------------

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